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COMPLETION-TEST LANGUAGE SCALES

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I wish to acknowledge here my indebtedness to those who have helped to make possible the completion of this study. Scores of teachers and school officers have coöperated with me in securing completion-test papers from over thirteen thousand public school pupils, and I am glad to record my obligation to them. It would be impossible to record here the names of all who have contributed thought and time to this investigation, but justice demands that I mention Professor E. L. Thorndike, whose example as an untiring scientific investigator and whose suggestive criticisms of this work as it has progressed have been of incalculable value. It would also be unjust not to mention my wife, without whose encouragement, and actual assistance in the monotonous mechanical work of scoring the results, this report would have been impossible.

M. R. T.

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COMPLETION-TEST LANGUAGE SCALES

I

INTRODUCTION

This monograph is the report of an attempt to derive one or more scales for the measurement of ability along certain lines closely related to language. No attempt has been made to define "language" in any strict sense, and it is entirely possible that some persons may be able to speak the English language and perhaps to write it fairly well without being able to make a very high score on these scales. It may also happen that some individuals will be found who score well on these language scales and are yet unable to quote a single rule of English grammar. On the whole, however, it will be found that ability to complete these sentences successfully is very closely related to what is usually called "language ability."

Professor H. Ebbinghaus,[1] who invented the completion-test method, characterized it as "a real test of intelligence." It has been variously classified by psychologists, as a test of "imagination," as an "association test," as a test of "memory," and as a test of numerous other "faculties." As a matter of fact, the completion of incomplete sentences correlates remarkably well with almost any other measure of desirable qualities. It would perhaps have been just as descriptive to have used the classification "general stand-out-ish-ness" suggested by Professor Hollingworth;[2] but the obvious dependence of the ability to complete sentences upon the ability to read and think about printed words, and the magnitude of the correlations obtained between the completion test and other tests of language ability seemed to justify the classification of the completion-test scales for educational purposes as "language scales."

---

[1] H. Ebbinghaus: Ueber eine neue Methode zur Prüfung geistiger Fähigkeiten und ihre Anwendung bei Schulkindern. *Zeitschrift für Psychologie*, Vol. 13 (1897), pp. 401–459.

[2] H. L. Hollingworth and others: An Experimental Study of Self-Analysis, Estimates of Associates, and the Results of Tests. *School and Society*, Vol. II (1915), pp. 171–179.

One of the difficulties with the completion test has been that it was almost impossible to measure progress with it, because of the impossibility of finding two paragraphs of exactly the same difficulty. The story of a paragraph does not pass out of one's mind completely, and it is therefore not quite fair to say that better completion of the same paragraph at the second trial means improvement in ability. The scales presented in this study are made up of sentences dealing with a wide variety of subjects, none of which are very interesting in themselves, and as a rule they are forgotten comparatively soon. Because of this variety of subject matter and the careful gradation of the sentences, it will be possible to use the same scale upon the same children, after allowing a year or more for them to forget about it, without greatly invalidating the results. This will not be necessary, however, for Scales B, C, D, and E are for all practical purposes equal and interchangeable. Scales J and K are fairly well matched, and likewise Scales L and M differ very little in their difficulty.

Having the tests arranged as steps on a scale with approximately equal intervals between the steps offers several advantages over the paragraph-completion method. The individual being tested is not discouraged by having a task set for him which is beyond his powers, nor is he disgusted at having to do child's play. The first sentences are easy enough to encourage the youngest child who can read them, and the last sentences are hard enough to require thought of well trained persons. With these smaller sentence units it is also possible to get a more accurate judgment as to the quality of an individual's performance, and the comparison of two such performances is much more valid. It is very much easier and more accurate to judge that a sentence is "right," "almost right," or "wrong" than it is to judge that a paragraph is 20 per cent, 35 per cent, or 70 per cent "right." The average teacher finds it almost impossible to assign paragraph-completion scores which are quite comparable to the scores that a trained psychologist would assign to the same paragraphs. Very few teachers will be found, however, who can not use the scales proposed in this monograph and, with the assistance of the suggested scheme for scoring given in the Appendix, secure results which may be compared directly with the results obtained by other teachers in other school systems.

Allowing the same amount of time to all pupils, and giving each pupil two credits for each sentence perfectly completed and one credit for each sentence almost perfectly completed, automatically takes account of the time spent upon the work, the quality of the work done, and the difficulty of the tests one is able to do. An elaborate system of weighting might be used, but the results would probably be no more accurate than those obtained by this simple method of scoring. The consecutive tests are so well graded that (except in Scale A, the use of which the writer does not recommend) there is only one chance out of four that any individual will complete a more difficult sentence without being able to complete those which precede it. If individual X can complete three sentences, individual Y four sentences, and Z five sentences on Scale D in the seven minutes allowed, we may feel fairly confident that X can complete the *first three*, Y the *first four* and Z the *first five* sentences, and that in ability to complete the sentences of Scale D, Z is as much better than Y as Y is better than X. In other words, with equal distances between steps, the same number of points score may be assigned for each step taken, without distorting the facts, for the score is cumulative.

II

LANGUAGE SCALE A

1. HISTORY OF ITS DERIVATION

During April, May, and June, 1914, the writer tested 855 pupils in two public schools of New York City with a "preliminary list" of fifty-six completion-test sentences. The results obtained indicated that a few of the sentences of this preliminary list were so constructed as to have little value as completion tests for children, and that, after rearranging the sentences in the order of their difficulty, there were a few places in the list where gaps occurred between consecutive sentences.

By throwing aside the poorly constructed sentences of the preliminary list, arranging the remainder according to their difficulty for the 855 children who had tried them, and attempting to write other sentences to fill the gaps found in the preliminary list, a second list of fifty-six sentences was prepared. This second list of fifty-six completion-test sentences will be referred to in this monograph as "The Graded Series."[1]

With the Graded Series of tests the writer tested, during the last two months of 1914 and the first month of 1915, over five thousand children in the public schools of New York and New Jersey. On the basis of these results, two sentences of the Graded Series were selected for each school grade, the two being selected for each grade which had proved to be just difficult enough to be done by about 50 per cent of the children in that grade. This list of twenty-four selected completion tests has for convenience been called "Language Scale A."[2] Scale A therefore contains two second grade sentences, two third grade sentences, and so on up through the eighth grade and high school, ending with two sentences which had proved so difficult that a rather small percentage of the first year college class had been able to complete them.

---

[1] This list was presented by the writer at the meeting of Section L of the American Association for the Advancement of Science, Dec. 31, 1914, at Philadelphia.

[2] Scale A was reported in *School and Society*, April 10, 1915, under the title, "Some Results of a Graded Series of Completion Tests."

2. Scale A, Itself

On each line of dots, write the word which makes the best meaning

ONLY ONE WORD ON EACH BLANK

II

x. The sky .... blue.

y. We are going .... school.

III

x. The kind lady .... the poor man a dollar.

y. The .... plays .... her dolls all day.

IV

x. Time .... often more valuable .... money.

y. Boys and .... soon become .... and women.

V

x. The poor baby .... as if it were .... sick.

y. The .... rises .... the morning and .... at night.

VI

x. It is good to hear .... voice .... friend.

y. She .... if she will.

VII

x. The poor little .... has .... nothing to ....; he is hungry.

y. The boy who .... hard .... do well.

VIII

x. Men .... more .... to do heavy work .... women.

y. It is a .... task to be kind to every beggar .... for money.

IX

x. Worry .... never improved a situation but has .... made conditions ....

y. A home is .... merely a place .... one .... live comfortably.

X

x. It is very .... to become .... acquainted .... persons who .... timid.

y. To .... many things .... ever finishing any of them .... a .... habit.

XI

x. One's real .... appears .... often in his .... than in his speech.

y. When one feels drowsy and ...., it .... happens that he is .... to fix his attention very successfully .... anything.

XII

x. The knowledge of .... use fire is .... of .... important things known by .... but unknown .... animals.

y. .... that are .... to one by an .... friend should be pardoned .... readily than injuries done by one .... is not angry.

XIII

x. To .... friends is always .... the .... it takes.

y. One ought to .... great care to .... the right .... of ...., for one who .... bad habits .... it .... to get away from them.

3. REPORT OF SCORES MADE ON SCALE A

During the months of April, May, and June, 1915, over six thousand children and young people spent fifteen minutes each in an attempt to complete the sentences of Scale A, as shown above. In those cases where a third page of sentences was added, enough more time was allowed to enable each individual to have a reasonable amount of time for each sentence. The majority of the classes tested were in the schools of New York and New Jersey, although records were obtained from a number of classes in Illinois, Indiana, Michigan, Missouri, and Pennsylvania.[1] The results from these other states indicated that there was no great difference in the abilities of children in the same grade in different states, so that the measurements here reported may be taken as fairly representative of conditions in general.

The detailed scheme by which each sentence was scored will be found in the Appendix, but in order that the reader may understand what is meant by the score, a word of explanation will be given here. Each sentence which the pupil had the opportunity to complete was given a score of 2 if perfectly completed, a score of 1 if almost but not quite perfectly completed, and a score of 0 if not attempted at all or if imperfectly done. The child who successfully completed two sentences in Scale A would therefore receive a score of 4, or 2 points for each sentence. If he had completed three sentences perfectly and a fourth very nearly perfectly, his total score would be 7 points. In this way anyone who did all the twenty-four sentences of Scale A perfectly in fifteen minutes would receive a total of 48 points, which is the maximum possible score in Scale A.

---

[1] In these cases it was impossible for the writer himself to give the tests, although there is every reason to believe that the results are fully comparable to those given by him personally. The classes chosen in these states were in each case chosen because of the principal's training and understanding of scientific testing, and detailed instructions were given each principal in order to secure exactly comparable results. All of the papers were scored by the same detailed scheme, which was prepared by the writer and will be found in the Appendix. All papers were scored either by the writer or by his wife, except in the case of some of the papers of the preliminary list on which some assistance was given by one other individual.

In the New York and New Jersey classes the writer hired substitute teachers to assist him in keeping time and collecting papers. He would instruct these assistants and train them so that they knew just what to do. He would then go to a class room, explain the test to the children, start them to work, and leave one of these assistants to collect the papers while he went to another room, where the same procedure was followed. In this way he was able with three assistants to obtain records from a large number of children in a short time. In a few instances these trained assistants were allowed to take complete charge of the administration of the tests after they had become thoroughly familiar with the process.

In addition to the six thousand individuals who tried Language Scale A in the form given above, I have gone through the records of the five thousand who tried the Graded Series, from which Scale A was selected, and have found the total score made by each individual in the twenty-four sentences of Scale A. The results from these two groups vary little and are combined in Table I, which shows the distribution of scores made by the pupils of each elementary school grade. Beginning at the lower left-hand corner, Table I indicates that a score of 0 was made by 255 of the 1318 pupils in the second grade, by 19 of the 1437 pupils in the third grade, and by 1 of the 1463 pupils in the fourth grade. Table I not only shows the number of pupils in each grade who made each score, but it also shows the median score, or the score made by the middle pupil of the grade if all the pupils of the grade were arranged in order according to the ability each exhibited in this test. In addition, Table I gives the range of score that would be necessary in each grade to include half of all the children in the grade, and the quartile, which is half of the range of the middle 50 per cent and will serve as a useful measure of the variability.

TABLE I

DISTRIBUTION OF SCORES MADE BY PUPILS OF EACH ELEMENTARY GRADE IN LANGUAGE SCALE A

Two points score given for each sentence perfectly completed

Score	Grade II	Grade III	Grade IV	Grade V	Grade VI	Grade VII	Grade VIII
48							
47							
46							
45							1
44						2	2
43						3	1
42					1	2	4
41						1	7
40						4	20
39					1	7	16
38					2	3	38
37			1	3	2	6	25
36					1	18	28
35				1	5	22	47
34				1	10	27	59
33					12	42	63
32				4	12	45	79
31				5	27	49	70
30			2	5	20	75	78
29			4	10	39	63	89
28			2	22	48	92	92
27		1	6	25	72	95	88
26			14	41	70	89	101
25		1	21	43	65	114	108
24		2	24	55	111	98	82
23		1	29	68	115	105	64
22		14	49	96	106	96	65
21		17	48	90	97	81	51
20	1	16	70	105	105	62	47
19	3	21	66	119	100	59	36
18		35	74	99	81	58	19
17	5	39	68	105	76	42	15
16	3	40	94	107	58	33	10
15	5	59	87	106	47	21	13
14	8	52	108	99	56	21	3
13	12	64	100	81	42	7	1
12	9	73	83	63	24	4	1
11	24	94	90	41	15	3	
10	22	103	80	44	13	2	1
9	34	85	72	19	7	4	1
8	74	110	80	20	7		1
7	47	106	62	12	2	1	
6	190	185	48	9	2		1
5	72	88	35	5			
4	367	142	29	3	1		
3	31	29	7		1		
2	135	35	6	1	1		
1	21	6	3				
0	255	19	1				
No. tested	1318	1437	1463	1507	1454	1456	1427
Median Score	4.591	8.986	14.329	18.389	21.917	25.272	28.060
25 Percentile	2.396	6.217	10.284	14.975	18.142	21.580	24.338
75 Percentile	6.566	13.043	18.598	22.023	25.361	29.079	32.421
Quartile	2.085	3.413	4.157	3.614	3.610	3.750	4.041

Medians and percentiles should not be worked out to the third decimal point in ordinary practice. Reporting the median to the nearest whole number or to the nearest tenth of a whole number will be better when dealing with Scale A, for reporting to the third decimal suggests a refinement of measurement to which Scale A can lay no claim, except in cases where large numbers of individuals have been measured, as in the case of Table I.

For those interested in the measurement of classes, Table II has been prepared, showing the distribution of median class scores in the elementary grades. As would be expected, the median of the class medians is very nearly equal to the median score of all children tested in any given grade.

TABLE II

DISTRIBUTION OF MEDIAN SCORES MADE BY ELEMENTARY SCHOOL CLASSES IN LANGUAGE SCALE A

Score	Grade II	Grade III	Grade IV	Grade V	Grade VI	Grade VII	Grade VIII
48							
47							
46							
45							
44							
43							
42							
41							
40							
39							
38							
37							
36							
35							
34							2
33							2
32							1
31						1	3
30						1	5
29						4	4
28						4	9
27						3	5
26				1	1	10	8
25					6	5	10
24				1	6	5	5
23				1	6	7	
22			2	1	3	5	
21				6	5	3	
20			1	4	10	1	
19			4	7	8		
18				5	2		
17			4	8	2		
16		1	1	5			
15		3	7	2			
14		1	6	2			
13		4	5	1			
12		5	2				
11	1	2	5				
10	1	6	4				
9		3	2				
8	1	3					
7	3	5	2				
6	3	6					
5	4	4					
4	10	2					
3	2						
2	5						
1	2						
0	1						
No. classes tested	33	45	45	44	49	49	54
Median of median scores	4.6	9.8	14.4	18.8	21.5	25.7	27.8

Table III gives facts similar to those of Table I, with regard to the higher grades in those school systems where it was possible to obtain results from the complete system including the high school. The group headed "College Graduates" was composed

TABLE III

DISTRIBUTION OF SCORES MADE BY HIGHER GRADES IN LANGUAGE SCALE A (COMPLETE SYSTEM GROUP)

Score	Grade VIII	Grade IX	Grade X	Grade XI	Grade XII	College Graduates
48						
47					1	5
46			1	1	3	11
45			1	2	1	14
44			2	3	6	12
43			7	5	5	12
42		6	5	2	3	16
41	1	4	5	2	6	9
40	2	8	4	7	4	4
39	2	6	7	13	7	4
38	8	11	9	14	8	7
37	4	7	19	11	9	4
36	3	6	7	5	6	4
35	10	11	3	11	7	4
34	10	18	12	10	6	1
33	17	12	11	12	6	3
32	18	20	8	6	7	2
31	16	13	13	5	5	1
30	17	17	16	4	4	
29	22	19	5	6		1
28	24	15	11	5	2	
27	18	21	8	3	4	
26	23	11	3	5	1	
25	27	19	2	2		
24	22	17	3	2		
23	17	5	1		1	
22	7	7	4			
21	15	5	1			
20	10	5	1			
19	7	4				
18	3	3			1	
17	1	1	1			
16	5	1				
15	2	1				
14			1			
13	1					
12	1					
11						
10						
9						
8						
7						
6						
5						
4						
3						
2						
1						
0						
No. tested	313	273	171	136	103	114
Median Score	27.861	30.147	33.682	35.727	37.167	42.812
25 Percentile	24.420	26.023	30.109	32.333	33.125	39.375
75 Percentile	31.797	34.486	37.908	39.077	40.812	45.107
Quartile	3.688	4.232	3.899	3.372	3.844	2.866

of graduate students in Educational Administration at Teachers College. This last group was used simply as a group superior to high school seniors.

4. CRITICISM OF SCALE A

It will be noticed as one glances up through the grades that each successive grade makes a higher score than the grade just previous and that the range of the middle 50 per cent likewise moves steadily upward. This is, of course, to be expected, although the relative amounts of progress between grades are unusual and need to be examined more carefully. The crude score intervals between grade medians are, according to Table I, roughly as follows:

Grades	II–III	III–IV	IV–V	V–VI	VI–VII	VII–VIII
Interval	4.4	5.3	4.1	3.5	3.4	2.8

There is no good reason for thinking that greater progress is made between the third and fourth grades than between the second and third, and careful examination proves that this relatively large advance between the third and fourth grades is due to imperfections in Scale A. If it had been possible, in the selection of the sentences for Scale A, to select two sentences of exactly "median" or 50 per cent difficulty for each grade, and then if the pupils tested later had performed exactly as those tested previously, there would have been a distinct tendency toward the equalization of the score intervals between grades, although the intervals would still have decreased in passing to higher grades. As it happened, the second grade sentences were distinctly too easy (59%, 58%); the third grade sentences too hard (46%, 46%); and the fourth grade sentences were practically 50 per cent sentences (50%, 54%). As a result, the third grade did not have as much of a chance to show superiority over the second as the fourth had over the third.

In a later section of this study the relative distances between grades are calculated to be about as follows:

Grades	II–III	III–IV	IV–V	V–VI	VI–VII	VII–VIII
Interval[1]	1.6	1.2	.9	.8	.8	.6

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[1] The unit upon which these intervals are calculated is the P.E., or the median deviation from the median of a grade distribution. This is explained in greater detail in the section headed "Normal Surface of Frequency Assumed" (p. 30–35), but for the present it may be thought of as a rather accurate unit of measurement which has the same value in all grades.

Fig. 1 gives a graphic comparison of the relations of the medians of the various school grades tested, measured first by the crude score on Language Scale A and second by the average of three determinations of the P.E. intervals.

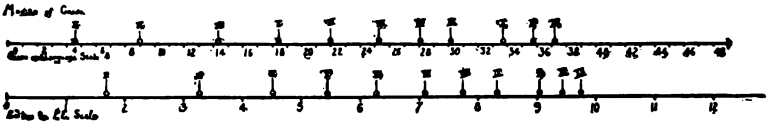

FIG. 1. Comparison of the Inter-Grade Intervals Obtained from Crude Score in Scale A with Those Obtained Statistically. Each circle above the line represents the position of the median of a school grade distribution on the scale shown below the line.

Although the relative positions of the grades are in many respects similar in the two projections shown above, the crude score on the Language Scale is clearly not sufficiently accurate to be used alone. An arrangement of the sentences of Scale A on a linear projection similar to the second in Fig. I shows how imperfectly Scale A is constructed.

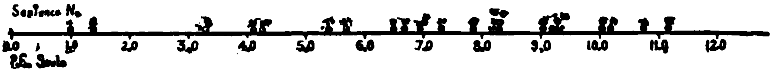

FIG. 2. Linear Projection of the Difficulty of the Sentences of Language Scale A.

A perfect scale for any function as complex as that tested by language completion tests would be very difficult to construct, although the scales presented in the next section of this report are far superior to Scale A in some particulars. It would be very convenient to have a scale in which each step was perfectly defined and exactly one unit more difficult than the step preceding it, but to secure such a scale would require an enormous amount of time and labor, and the advantage gained over a scale which approximates those conditions would be slight. A glance at Fig. 2, however, shows that there would be great improvement in Language Scale A if another step were introduced between sentences 2 and 11 and if some of the sentences between 6 P.E. and 9 P.E. were omitted. The positions of the various school grade medians on the crude score projection in Fig. 1 indicate the same difficulty in Scale A.

5. SUGGESTIVE RESULTS OF ITS USE

In spite of the inequalities that occur in the steps on Language Scale A, it has shown some rather interesting possibilities. There is a very general conviction among teachers that girls have greater ability along language lines than boys. I have gone through my records of sixth grade children and tabulated the scores of 1224 of them according to sex and age.[1] The results are shown in Table IV.

On the whole, it appears from Table IV that boys make a somewhat lower median score than girls in the same grade, although the difference is small and the amount of overlapping is enormous. A small sampling from the other elementary grades indicated that the same conditions hold true there, so the facts shown in Table IV may be taken as fairly typical. It is interesting to note that there is a rather distinct tendency for the older pupils in the grade to make lower scores than those younger. This suggests that teachers are possibly inclined to promote dull pupils because of their age and to retard the bright pupils because of their youth. However that may be, Table V makes it pretty clear that ability counts for a great deal more than age in determining promotion.

In view of all that has been said recently concerning the inability of teachers to judge the abilities of their pupils and to promote them accordingly, the facts shown in Table V are rather surprising. To say that a child is twelve years old apparently signifies far less concerning his ability to complete sentences than to say that he is in the sixth grade. The variability of the sixth grade, if the quartile is taken as a measure, is only about 73 per cent of the variability of the twelve-year-olds. The median score of each grade group of twelve-year-old children is remarkably near the median score shown in Table I for all children in that grade group. There is undoubtedly a very close relation between the criteria used by teachers in promoting pupils and the abilities required to complete mutilated sentences.

To measure progress in individual pupils and classes should be one of the uses of a good scale. In one school where the writer had given the Graded Series in November, 1914, the superin-

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[1] This tabulation was made before all of the results were available, and therefore the total number of sixth grade children in this tabulation is smaller than the total shown in Table I.

TABLE IV

DISTRIBUTION OF SCORES MADE BY SIXTH GRADE CHILDREN

Score	Girls							All Girls	Boys							All Boys	Both Sexes
	Age								Age								
	10	11	12	13	14	15	16		10	11	12	13	14	15	16		
48																	
47																	
46																	
45																	
44																	
43																	
42									1							1	1
41																	
40																	
39					1			1		1						1	2
38		1						1		1						1	2
37		1		1				2				1				1	3
36				1				1			1					1	2
35	1	1						2		1	1					2	4
34	1	2	1	1				5		2	1		1			4	9
33	2		1					3		2	5					7	10
32		2	3	2				7	1	2	3	1				7	14
31	1	2	6	1	1			11	2	6	6	2				16	27
30	1	4	4	2				11		3	6					9	20
29	3	14	4	1	3			25		6	7	2	2			17	42
28	2	7	1	3	3	1		17	4	16	10	7	2	1		40	57
27	4	10	9	6	1	1		31	3	11	5	7	2	1		29	60
26	2	8	4	7	2			23	3	12	11	9				35	58
25	1	6	7	3	1			18	7	7	12	9	3	1		39	57
24	6	9	12	8	7			42	9	10	17	10	2	2		50	92
23	3	8	9	9	6	2		37	9	17	18	9	5	1		59	96
22	4	11	16	4	3	1		39	5	10	18	10	5	2		50	89
21		4	9	6	3			22	4	12	14	16	5	4		55	77
20	1	6	8	7	2			24	5	13	17	14	7			56	80
19	2	3	9	7	3	2	1	27	2	24	19	8	2		1	56	83
18	1	3	6	6	3	1		20	2	11	12	9	7	1		42	62
17		3	6	4	2	2		17	6	6	11	10	3	5		41	58
16	1	1	2	4	1	1		10	1	6	16	5	8	2		38	48
15		3	2	1	2			8	1	4	10	8	2	2		27	35
14		1	2	4	2			9	2	9	7	7	6	2	1	34	43
13	2		5	2				9	1	4	2	6	4	4	2	23	32
12		1		2	1	1		5		3	6	3	1	1		14	19
11			1	1				2		1	1	6	1	1	1	11	13
10		1	1	1				3	1	1	3	1	1			7	10
9		1						1	1		2	2	2			7	8
8					1			1			2	1	1			4	5
7				1				1					1			1	2
6												1				1	1
5																	
4															1	1	1
3													1			1	1
2															1	1	1
1																	
0																	
No. tested	38	113	128	95	48	12	1	435	70	201	243	164	74	30	7	789	1224
Median Score	24.8	25.2	22.8	22.4	23.2	19.5	19 5	23.5	23.4	22.6	21.9	21.1	18.9	17.6	13.3	21.5	22.4
25 percentile								19.9								17.7	18.5
75 percentile								27.3								25.3	26.1
Quartile ...								3.7								3.8	3.8

TABLE V

Distribution of Scores Made by Twelve-Year-Old Children

Score	Girls						All Girls	Boys						All Boys	Both Sexes
	School Grade							School Grade							
	III	IV	V	VI	VII	VIII		III	IV	V	VI	VII	VIII		
48															
47															
46															
45															
44													2	2	2
43												1	1	2	2
42					1		1								1
41						1	1								1
40					1	1	2					1	2	3	5
39					2	1	3					2	1	3	6
38						1	1					3	2	5	6
37												2	3	5	5
36				1	3		4				1	2	3	6	10
35				3	4	2	9				3	1	3	7	16
34				3	4	2	9				2		3	5	14
33				4	3	3	10				5	5	3	13	23
32				4	7		11				5	6	5	16	27
31				4	6	2	12			3	1	9	3	16	28
30				5	8	4	17				6	8	6	20	37
29				4	10	3	17			1	9	4	6	20	37
28				5	7		12			1	9	5	7	22	34
27			5	13	6	2	26			3	8	16	3	30	56
26			4	9	4	3	20				11	13	3	27	47
25		1	1	5	10	1	18		1	5	14	24	5	49	67
24			3	17	3	1	24			3	16	18	3	40	64
23			2	13	3	4	22		1	5	19	20	3	48	70
22		2	3	14	4		23		1	2	19	14	3	39	62
21		1	8	13	7		29		1	4	15	15		35	64
20		3	6	12		1	22		2	9	23	8	3	45	67
19			6	8	6	2	22		2	11	21	9		43	65
18		2	4	6	1		13			8	13	8	1	30	43
17		2	2	6	2		12	1	2	15	12	8	2	40	52
16		3	4	4	3		14	2	6	11	18	4		41	55
15		2	9	5			16		3	8	13	6		30	46
14	1	4	5	5	3		18		7	19	8	4		38	56
13		2	5	5			12	2	5	11	5			23	35
12	1	4	5	1			11	3	3	10	5			21	32
11		3	3	1			7	2	3	5	2			12	19
10	1	3	3	1			8	2	1	6	3			12	20
9		5	3				8	2	2	5	2	1		12	20
8	1	7	1				9	2	9	3	1			15	24
7		2					2	1	6	4				11	13
6								3	2	1				6	6
5	2	1					3	1	2	1				4	7
4									1					1	1
3															
2								1	1	1				3	3
1															
0									1					1	1
No. tested	6	47	82	171	108	34	448	22	62	155	269	217	76	801	1249
Median Score	9.5	12.6	18.3	23.4	28.3	30.0	22.8	10.5	12.9	16.3	21.6	24.7	29.8	21.4	21.9
25 percentile							17.3							16.3	16.5
75 percentile							27.9							26.1	26.9
Quartile							5.3							4.9	5.2

TABLE VI

Amounts of Improvement in Language Scale A Made in Six Months' Work in School

Amount of Improvement	Eight-Year-Old Boys	Eight-Year-Old Girls	Twelve-Year-Old Boys	Twelve-Year-Old Girls
18				
17	1			
16	2	2		1
15	1	1	1	
14		1	2	1
13			4	3
12		2		2
11	1	3		1
10	1	1	7	2
9		1	2	5
8	1	5	11	13
7	1	7	6	4
6	3	7	10	9
5	3	3	10	6
4	5	11	6	5
3	6	4	6	6
2	7	7	5	6
1	1	2	4	5
0	11	4	3	4
−1			2	4
−2			2	1
−3			3	1
−4				
−5				1
No. tested	44	61	84	80
Median Improvement	3.5	5.8	6.1	6.1

Table VI indicates that 11 boys and 4 girls in the eight-year-old group made exactly the same score in June as in November, while one boy and two girls made one point more in June than in November, etc. It is interesting to note that some of the twelve-year-old children actually made poorer scores in June than they had made in November.

tendent gave Language Scale A in June, 1915. The mid-year promotions which intervened had distributed the class groupings so that it was impossible to measure the progress of classes. The writer, however, searched out the November records of a group of eight-year-old children and of a group of twelve-year-old children to determine what score each of these children had made on the twenty-four sentences of Scale A. This record for each individual was then compared with his June record in Scale A, and any change of score was recorded. Table VI shows the changes that were found. The superintendent had emphasized the language work throughout the year on account of the poor showing made in November, so that the amount of progress shown in Table VI is possibly somewhat larger than would ordinarily be found.

As we have already seen, the steps on Scale A are not equal in length. An improvement of ten points score may therefore mean something entirely different to two individuals, one of whom improves from 5 to 15 and the other from 20 to 30. For this reason the facts shown in Table VI are of little value, except as an illustration of how improvement may be measured now that we have scales on which the consecutive steps are equal.

III

ADDITIONAL LANGUAGE SCALES

1. USE OF SHORT SCALES

Although Language Scale A has proved itself a rather useful instrument, it has seemed best to arrange a number of shorter scales in which the intervals between steps are more nearly equal. It often happens that an individual does not feel "at his best" on certain days and, whether his level of performance is actually lower or not, at such times he feels that it is an injustice to him to have his ability judged on the basis of his "off day" performance. Measurements of individuals made for the purpose of obtaining correlations between tests are more useful if made at two or more different times with equal tests, for such a procedure allows one to make some very desirable corrections for the attenuation due to chance inaccuracies in the measures. Evidence from two or more measurements of the same individual becomes cumulative and convincing, while a single measurement may be overlooked as not significant. In fact, the amount of difference between the two measurements will often be taken as a rough indication of the reliability of the measurements. For these and other reasons the writer recommends that in measuring individuals two short scales be used rather than one long scale.

Although it will always be advisable to use more than one of the short scales when an accurate measurement of an individual is desired, a class may be measured fairly well by means of a single scale. The chance inaccuracies in the measurement of an individual, whereby a single measurement gives him credit for more or for less ability than he deserves, tend to be balanced by inaccuracies in the opposite direction from the measurements of other individuals when a group is being measured. Improvement in a class may be measured by comparing the median score made by the class on one scale with the median score made by the class at a later date on another scale of the same difficulty, or even better by comparing the total distribution on one scale with the total distribution on the other equal scale.

2. SCALES B AND C

Language Scales B and C are chosen entirely from the carefully evaluated sentences of the Graded Series and the writer feels a great deal of confidence in them. Each of these two scales consists of ten steps or sentences, each step being about 1 P.E. above the previous step. Scale C, however, is on the whole about .4 P.E. more difficult than Scale B. These two scales are as follows:

Write only one word on each blank.
Time limit, seven minutes.

Name ....

LANGUAGE SCALE B

1. We like good boys .... girls.
6. The .... is barking at the cat.
8. The stars and the .... will shine tonight.
22. Time .... often more valuable .... money.
23. The poor baby .... as if it were .... sick.
31. She .... if she will.
35. Brothers and sisters .... always .... to help .... other and should .... quarrel.
38. .... weather usually .... a good effect .... one's spirits.
48. It is very annoying to .... tooth-ache, ... often comes at the most .... time imaginable.
54. To .... friends is always .... the .... it takes.

Write only one word on each blank.
Time limit, seven minutes.

Name ....

LANGUAGE SCALE C

2. The sky .... blue.
5. Men .... older than boys.
12. Good boys .... kind .... their sisters.
19. The girl fell and .... her head.
24. The .... rises .... the morning and .... at night.
30. The boy who .... hard .... do well.
37. Men .... more .... to do heavy work .... women.
44. The sun is so .... that one can not .... directly .... causing great discomfort to the eyes.
53. The knowledge of .... use fire is .... of .... important things known by .... but unknown .... animals.
56. One ought to .... great care to .... the right .... of ...., for one who .... bad habits .... it .... to get away from them.

The exact difficulty of each sentence in Scales B and C, with the intervals between consecutive steps, is shown in Table VII.

TABLE VII

STEPS AND INTERVALS BETWEEN STEPS ON SCALES B AND C. 1 = P.E.

Language Scale B			Language Scale C		
Sent. No.	Value	Interval	Sent. No.	Value	Interval
1	.96		2	1.38	
		1.02			1.14
6	1.98		5	2.52	
		.96			1.06
8	2.94		12	3.58	
		1.32			.89
22	4.26		19	4.47	
		1.14			1.22
23	5.40		24	5.69	
		1.10			1.26
31	6.50		30	6.95	
		.92			.90
35	7.42		37	7.85	
		1.00			1.10
38	8.42		44	8.95	
		1.08			1.10
48	9.50		53	10.05	
		1.26			1.12
54	10.76		56	11.17	

The same facts are shown graphically in Fig. 3.

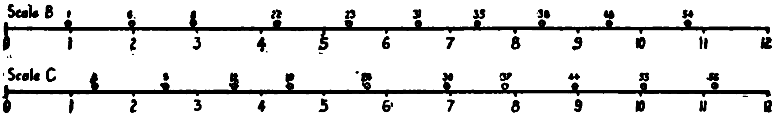

FIG. 3. Linear Projection of Language Scales B and C.

Exactly seven minutes of actual work should be allowed any individual on either of these two scales. In testing school children, the procedure outlined below should be carefully followed in order that all measurements may be exactly comparable.

3. DIRECTIONS FOR ADMINISTERING TESTS

If the class to be tested is a fourth grade class or higher, oral explanations will be sufficient. Below the fourth grade it will be necessary to distribute to each pupil the following practice list, before allowing any pupil to see the scale with which he is to be measured.

Practice Sheet

Two and two are ....
A boy is little, but a man is ....
Girls and boys can run .... play.
The boy has .... book.

After passing one of these practice sheets to each child, make the following general explanations:

I want to see if you can read what is printed on the little sheet of paper, and whether you can guess what words have been left out. Each little dotted line shows where a word was left out. If you can guess what word ought to be there, write it on the dotted line. Write just one word on each blank. Make each line say something.

After making the above explanation, the teacher and the examiner should give assistance to any child who does not understand, seeing that each child learns what is expected.

After the examiner is confident that each child has the correct idea of how to proceed, a copy of the scale to be used should be held up in full view of the entire class and the statement made that "This page is very much like the little sheet on which you have just been working, except that the last sentences on this sheet are very much harder." From this point the procedure is practically the same as that for the higher grades.

In the fourth grade or above, or after the preliminary practice just described has been completed in a lower grade, the following oral explanation of the scale to be used should be made before distributing any papers:

This sheet contains some incomplete sentences, which form a scale. This scale is to measure how carefully and rapidly you can think, and especially how good you are in your language work.

You are to write one word on each blank, in each case selecting the word which makes the most sensible statement.

You may have just seven minutes in which to sign your name at the top of the page and write the words that are missing. The papers will be passed to you with the face downward. Do not turn them over until we are all ready. After the signal is given to start, remember that you are to write just *one* word on each blank and that your score depends on the number of perfect sentences you have at the end of seven minutes.

If there are no questions, the papers may then be distributed, taking care that no child looks at the printed side until there is a paper upon the desk of each child and the following additional instructions have been given:

> After you have been working seven minutes, I shall say, "The time is up. All stop writing!" You will all please stop at once and lay aside your pens (or pencils). Now if you are all ready, you may turn your papers, sign your names and fill the blanks.

Take note of the exact time at which the signal to start was given, allow exactly seven minutes, and give the command to stop writing. Collect all papers at once. It is very important that exactly seven minutes be allowed. A stop watch is the most satisfactory means of keeping the time on a test of this sort.

Grade each paper according to the scheme shown in the Appendix of this monograph, and make a record of the total number of points made by each child, in order that the amount of progress made by each pupil may be readily determined when the scale is used the second time. (It would be advisable not to use the same scale again until a year or more has passed. Use a different scale of the same difficulty.)

To calculate the median score of a class follow the directions given in Section 3 of the Appendix.

4. SCALES D AND E

Language Scales D and E are practically of the same difficulty as Scales B and C. Scales D and E, however, each contain four sentences which were not a part of the Graded Series,[1] and although these two scales will be found very satisfactory, it is entirely possible that the difficulty of any one of the eight sentences referred to may differ as much as .3 or .4 P.E. from the value I have assigned to it. As a matter of fact, the course of this investigation has shown that the difficulty of a test sentence is influenced rather markedly by the number and character of the sentences near it. This does not, however, invalidate the scale; it merely indicates that the final value of each step on a scale of this kind cannot be determined accurately until thousands of children of all grades have attempted the scale in its final form. Indeed, it is questionable whether the utilities added by knowing so accurately the final value of each step would be of sufficient practical importance to pay one for the labor of making the determination.

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[1] All sentences numbered from 1 to 56 were in the Graded Series and, as will be found from reading Chapter IV of this monograph, the difficulty of each of them has been very well defined. The difficulty of all sentences numbered above 56 has been estimated as carefully as possible.

Language Scales D and E are as follows:

Write only one word on each blank.
Time limit, seven minutes.

Name ....

LANGUAGE SCALE D

4. We are going .... school.
76. I .... to school each day.
11. The .... plays .... her dolls all day.
21. The rude child does not .... many friends.
63. Hard .... makes .... tired.
27. It is good to hear .... voice .... friend.
71. The happiest and .... contented man is the one .... lives a busy and useful ....
42. The best advice .... usually .... obtained .... one's parents.
51. .... things are .... satisfying to an ordinary .... than congenial friends.
84. .... a rule one .... association .... friends.

Write only one word on each blank.
Time limit, seven minutes.

Name ....

LANGUAGE SCALE E

73. I see you. Can you see ....?
75. Ice is cold, but fire is ....
7. The kind lady .... the poor man a dollar.
18. The best .... to sleep is at night.
58. Children should .... many lessons from .... parents.
25. The child .... the river .... was drowned.
34. It is a .... task to be kind to every beggar .... for money.
36. Worry .... never improved a situation but has .... made conditions ....
52. When one feels drowsy and ...., it .... happens that he is .... to fix his attention very successfully .... anything.
83. In order .... clearly at .... it is .... to .... artificial ....

The difficulty of each sentence in Scales D and E is shown in Table VIII.

TABLE VIII

STEPS AND INTERVALS BETWEEN STEPS ON SCALES D AND E. 1 = P.E.

Language Scale D			Language Scale E		
Sent. No.	Value	Interval	Sent. No.	Value	Interval
4	1.00		73	1.18	
		.97			.45
76	1.97		75	1.63	
		1.34			1.71
11	3.31		7	3.34	
		1.09			1.08
21	4.40		18	4.42	
		1.14			1.13
63	5.54		58	5.55	
		1.13			.77
27	6.67		25	6.32	
		.97			.99
71	7.64		34	7.31	
		1.22			1.01
42	8.86		36	8.32	
		.92			.97
51	9.78		52	9.29	
		1.07			1.26
84	10.85		83	10.55	

Fig. 4 represents the same facts in a graphic way.

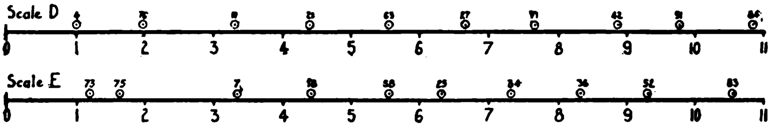

FIG. 4. Linear Projection of Language Scales D and E.

It will be observed that Scale E is somewhat more irregular and has a slightly shorter range than Scale D. The lower end of Scale E is a bit more difficult than the lower end of Scale D, while Scale D is the more difficult in the upper ranges. In spite of these differences, these two scales may ordinarily be used as though they were equal to each other and to Scales B and C.

The instructions given above for the administration of Scales B and C apply equally well to these two scales.

5. Scales J and K

Scales J and K are intended to measure the abilities of young people and adults rather than of children. The time to be allowed is exactly five minutes for each of the scales, although the general procedure described above for Scales B and C should be followed in their administration. The intervals between steps in these two scales are intentionally made long, the upper steps are very high, and there are no sentences easier than 4. P.E. Care should be taken not to confuse Scales J and K with any other scales, for each of these two is equal to the other only.

Language Scales J and K are as follows:

Write only one word on each blank.
Time limit, five minutes.

Name ....

LANGUAGE SCALE J

29. Boys and .... soon become .... and women.
61. The .... are often more contented .... the rich.
64. The rose is a favorite .... because of .... fragrance and ....
41. It is very .... to become .... acquainted .... persons who .... timid.
93. Extremely old .... sometimes .... almost as .... care as ....
87. One's .... in life .... upon so .... factors .... it is not .... to state any single .... for .... failure.
89. The future .... of the stars and the facts of .... history are .... now once for all, ... I like them .... not.

Write only one word on each blank.
Time limit, five minutes.

Name ....

LANGUAGE SCALE K

16. The boy will .... his hand if .... plays with fire.
57. Hot weather comes in the .... and .... weather .... the winter.
28. The poor little .... has .... nothing to ....; he is hungry.
33. Very few people .... how to spend time and .... to the best advantage.
82. One .... not, as a ...., ... attention .... uninteresting things.
90. To eat .... one is .... is a .... pleasure.
86. .... they .... us .... not, nature's .... are .... and unchangeable.

Table IX shows the values that were obtained for each sentence in Scales J and K.

TABLE IX

STEPS AND INTERVALS BETWEEN STEPS ON SCALES J AND K. 1 = P.E.

Language Scale J			Language Scale K		
Sent. No.	Value	Interval	Sent. No.	Value	Interval
29	4.12		16	4.15	
		1.73			1.83
61	5.85		57	5.98	
		1.17			1.06
64	7.02		28	7.04	
		1.35			1.34
41	8.37		33	8.38	
		1.16			1.18
93	9.53		82	9.56	
		1.22			1.23
87	10.75		90	10.79	
		1.56			1.86
89	12.31		86	12.65	

Fig. 5 is a linear projection showing the positions of each sentence of Scales J and K on the P.E. scale.

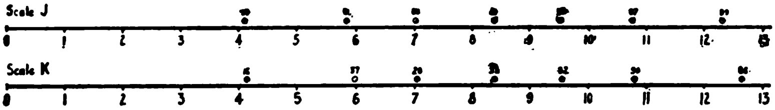

FIG. 5. Linear Projection of Language Scales J and K.

The value obtained for each sentence in Scale K is remarkably near the value obtained for the corresponding sentence in Scale J. The possibility that some of these values may shift when tried out on thousands of individuals is, however, even greater than in the case of Scales D and E. The values given in Table IX are nevertheless the most accurate obtainable at present and may be used with confidence until more exact values have been established. Scales J and K are unquestionably the most equally matched pair of completion tests for measuring young people and adults that have yet been obtained in the English language.

6. SCALES L AND M

For the measurement of smaller differences in the abilities of secondary school pupils, I have arranged Scales L and M, which begin at about 7 P.E. and progress by relatively small steps to over 11 P.E. These are also five-minute tests. It is believed that they will be found very valuable to secondary school teachers and others interested in the abilities of young people.

The sentences composing Language Scales L and M are given below.

Write only one word on each blank.
Time limit, five minutes.

Name ....

LANGUAGE SCALE L

60. Children .... are rude .... not easily win friends.
66. Plenty .... exercise and .... air .... healthy .... and girls.
70. In .... to maintain .... health, one should have nourishing ....
65. .... happiness can not be .... with money.
32. One's .... do .... always express his thoughts.
92. To .... to wait, after having .... to go ...., ... very annoying.
78. It is sometimes .... to .... between two .... of action.
97. One can .... do his .... at one .... while .... of another.

Write only one word on each blank.
Time limit, five minutes.

Name ....

LANGUAGE SCALE M

67. One can not foretell .... will happen in the ....
59. The dog .... a useful .... because .... his intelligence and faithfulness.
95. Many people .... their health because .... do not .... the .... of hygiene.
79. Nothing can .... one's happiness .... effectively than a guilty ....
45. To .... many things .... ever finishing any of them .... a .... habit.
91. The .... seems .... and dreary................ a discouraged ....
55. .... that are .... to one by an .... friend should be pardoned .... readily than injuries done by one .... is not angry.
88. It is .... that a full-grown man should .... a ghost .... he is ....

Table X shows the values which have been obtained for each sentence in Scales L and M.

TABLE X

STEPS AND INTERVALS BETWEEN STEPS ON SCALES L AND M. 1 = P.E.

Language Scale L			Language Scale M		
Sent. No.	Value	Interval	Sent. No.	Value	Interval
60	6.83		67	6.93	
		.57			.53
66	7.40		59	7.46	
		.51			.48
70	7.91		95	7.94	
		.47			.54
65	8.38		79	8.48	
		.53			.56
32	8.91		45	9.04	
		.80			.84
92	9.71		91	9.88	
		.43			.31
78	10.14		55	10.19	
		.97			.95
97	11.11		88	11.14	

Fig. 6 shows the positions of all sentences in Scales L and M.

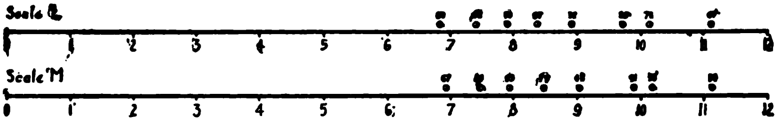

FIG. 6. Linear Projection of Language Scales L and M.

NOTE: The scales described in this chapter, together with the Practice Sheet shown on page 21, may be purchased in any quantity from the Teachers College Bureau of Publications.

IV

CALCULATION OF THE DIFFICULTY OF TEST SENTENCES

1. Variability of a Grade as the Unit

The comparison of adjectives is a device used by all people to denote different *amounts* of qualities. When one makes the judgment that John is "brighter" than Joe, he has made a rough measurement of the amount of the quality termed "brightness" possessed by these two boys. If everyone knew John and Joe and their relative brightness, and if these two boys maintained exactly the same degrees of that quality from the present time forward, John and Joe might serve as a rough scale for brightness. It would then be possible to say that James has "the brightness of John" with some assurance of being understood. The difficulty with such an arrangement is that John and Joe both change in brightness and at different rates. It is also impossible for everyone to know these two boys, and therefore they cannot be of very wide service as a brightness scale. Any scale that is to be of much service must be built of units the amounts of which remain constant and in such form that they can be readily examined by anyone interested or verified by any competent person.

It would be possible to build up a completion-test scale by merely selecting a series of sentences which the majority of a group of people agreed upon as arranged in the order of their difficulty. Or, one might select as a scale a series of sentences which had been tried upon a group of children and found to be so arranged in the order of their difficulty that each consecutive sentence was correctly completed by just 10 per cent of the group less than had completed the previous sentence. Such scales would no doubt be much more useful than an entirely ungraded series of sentences. Unless the above scales were based upon a firmer foundation than I have indicated, however, it would perhaps be found that a second group of judges would disagree with the first group in regard to a few of the sentences, and that a second group of children would show percentages entirely different from the first, possibly to the extent of showing no more than 20 per cent difficulty between the hardest and the easiest sentences in the series, which with the previous group had a range of 100 per cent. There is need for some less changeable unit than uncertain majorities or percentages of variable groups.

One of the most constant things about a variable fact is the amount of its variability. One's accuracy as a judge of any quality remains fairly constant, and the accuracy of one group of judges very nearly equals the accuracy of any other similarly chosen group.

The variation in the abilities of the children in one group is about equal to the variation in the abilities in any other group of children chosen in the same way. Teachers select their brightest pupils for promotion and refuse to promote the dullards. Now the abilities of teachers to make this selection is about the same in one school system as it is in another, and about the same in eighth grade teachers as it is in second grade teachers. As a result, one school grade may differ quite markedly from another in ability and yet the amount of variability in one will be very nearly equal to the amount of variability in the other. If one desires to make a scale for use in all grades, then, it would seem desirable to use some measure of the variability of a grade as the unit, since this is at once common to all grades and only slightly variable in itself.

2. NORMAL SURFACE OF FREQUENCY ASSUMED

Before choosing any particular measure of the variability of a grade to be used as a unit of measurement, it will be valuable to discover how the "completion-test ability" is distributed in each grade. If this ability is distributed in the same way as the abilities by which teachers judge to what grade a child belongs, we should expect to find most of the children in any given grade clustered about the average or median for that grade. We should not expect to find that teachers always make perfect judgments as to promotions, but we should expect to see fewer large errors than small ones. In short, we should expect to find the abilities of the children in any given grade distributed symmetrically on each side of the average, as shown in Fig. 7.

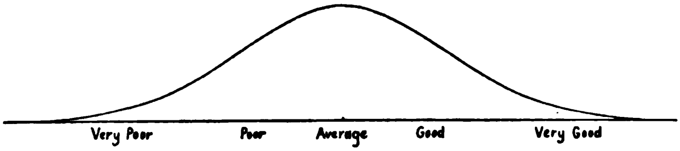

FIG. 7. Symmetrical Form of Distribution of Abilities to be Expected of Children in Any Given Grade.

The height of the curve above the base-line indicates the number of individuals in the class having the ability shown on the base-line scale. Each individual is represented by an equal amount of the total area inclosed by the curve and the base-line.

Assuming that Language Scale A is a reasonably valid measuring instrument for the completion-test ability, Figs. 8 to 14 show how this ability was distributed in the 1400 children of each elementary grade tested by the writer.[1] Except in the second and third grades,[2] the curves are remarkably symmetrical and regular, conforming on the whole to the general characteristics of the normal surface of distribution shown in Fig. 7.[3] All the evidence at hand leads us to believe that the distribution of the abilities measured by the completion test conforms to this shape in each grade, and it will therefore be assumed throughout the remainder of this study.

Assuming the normal surface of frequency, then, the Median Deviation or P.E. from the median will be the most convenient measure of the variability to use as a unit. Of course one might use the distance between the best and the poorest individuals in the class as a measure of the variability, but this would give such a large unit that the scale would be practically useless as a measure of small differences. Another reason for not using the extreme range of the distribution as a measure is the fact that the few very poor individuals and the few very good individuals in each grade would have more influence over the size of the unit than all the hundreds of average children in the grade.

---

[1] The data upon which Figs. 8 to 14 are based are shown in Table I.

[2] The excessive height of the columns for scores of 0, 2, 4, 6 and 8 in the second and third grade figures is due to the peculiarities of the method of scoring, in that 2 points score were given for each perfect sentence and 1 point for each partially perfect sentence. The children in these lower grades as a rule either get the sentence perfect or not at all.

[3] This fact in itself is not conclusive proof that completion-test ability is distributed according to the normal surface of distribution. Better proof is found in the fact that if this assumption is made the results that follow are in such close accord with known facts.

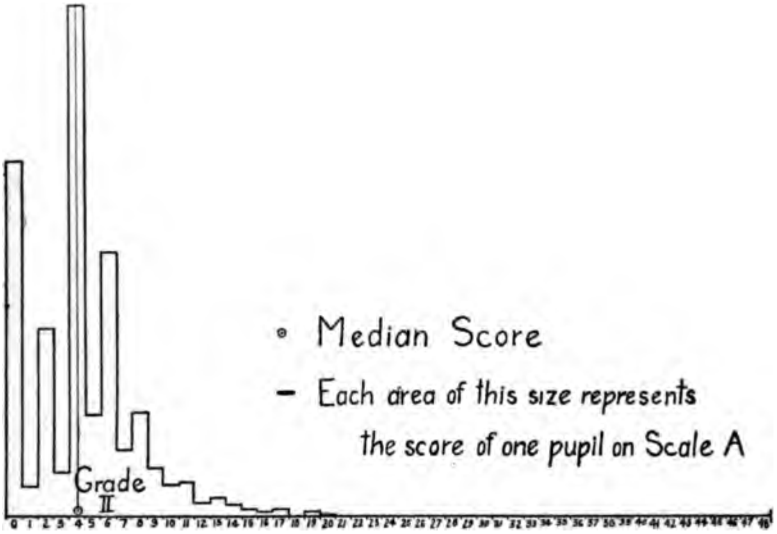

FIG. 8. Distribution of Scores Made by Second Grade Pupils on Scale A.

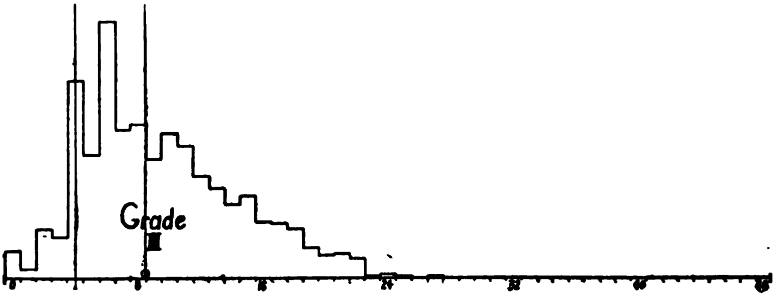

FIG. 9. Distribution of Scores Made by Third Grade Pupils on Scale A.

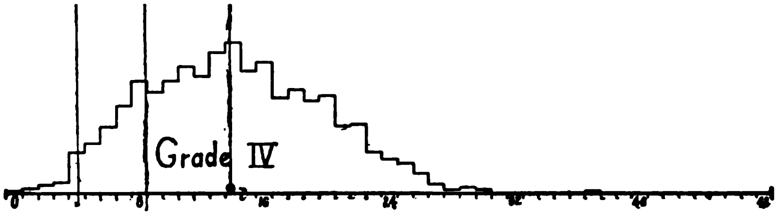

FIG. 10. Distribution of Scores Made by Fourth Grade Pupils on Scale A

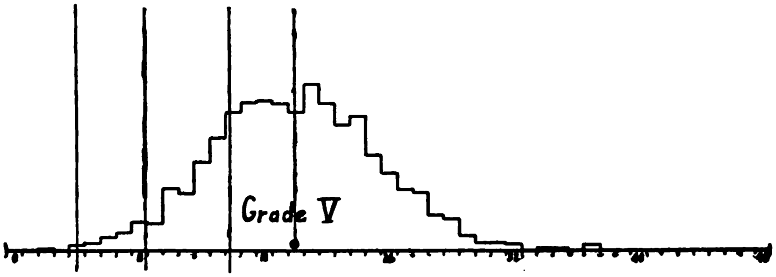

FIG. 11. Distribution of Scores Made by Fifth Grade Pupils on Scale A.

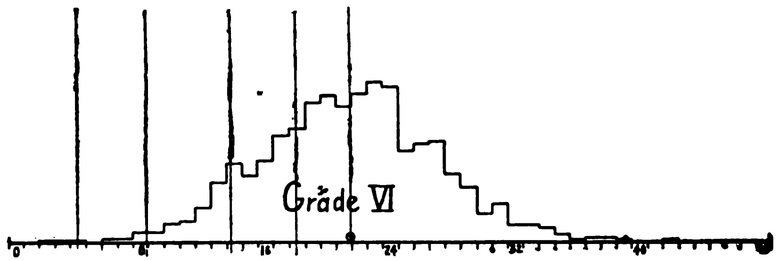

FIG. 12. Distribution of Scores Made by Sixth Grade Pupils on Scale A.

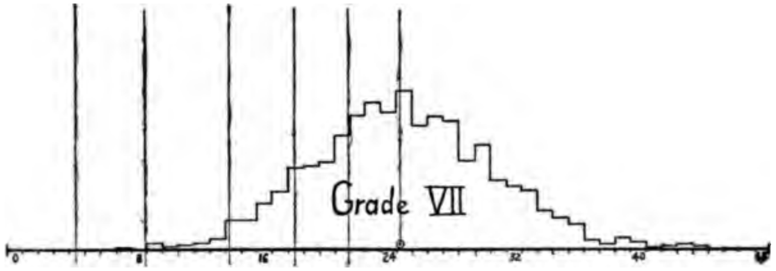

FIG. 13. Distribution of Scores Made by Seventh Grade Pupils on Scale A.

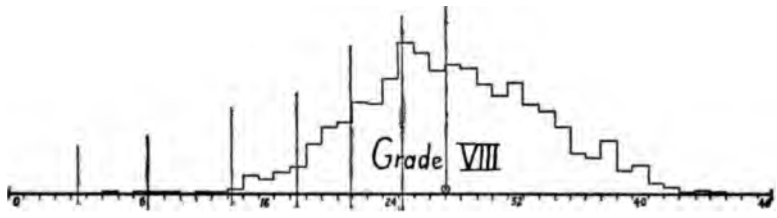

FIG. 14. Distribution of Scores Made by Eighth Grade Pupils on Scale A.

The median deviation is the median amount of deviation, whether the deviations are above the median of the distribution or below. If all the children in the grade were arranged in order according to their distance from the median along the base-line scale, we might begin at the median and count out just one half of the children. The distance along the base-line covered in counting out half of the children would be the median deviation.

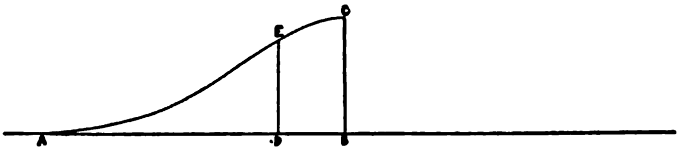

FIG. 15. Lower Half of a Normal Surface of Frequency.

Fig. 15 shows the lower half of a normal surface of frequency, with a line drawn perpendicular to the base in such a way as to cut off just one half of the area below the median. Half of the deviations represented by the total area shown are greater than line BD and half of them are less than line BD. BD is therefore the median deviation from the median, or the P.E., as it will be called for convenience in this study.

Since the normal surface of distribution is perfectly symmetrical, the area ABC shown in Fig. 15 represents just one half or 50 per cent of all the individuals represented by the total surface. Since area DBCE is just one half of area ABC it must contain one fourth or 25 per cent of the total number of individuals. If one draws a line perpendicular to the base at a point 1 P.E. below the median of a normal surface of distribution, he will always divide the lower half of the distribution into two equal parts, each of which contains 25 per cent of the total distribution. Drawing a line 1 P.E. above the median would likewise divide the upper half of the distribution into two equal parts, each containing 25 per cent of the total area.

The characteristics of a normal surface of distribution have been very carefully worked out. We know that the middle 50 per cent of any such surface is contained within the limits −1 P.E. and +1 P.E. We know that if we start from the median of the distribution and go 1 P.E. in either direction, a perpendicular line

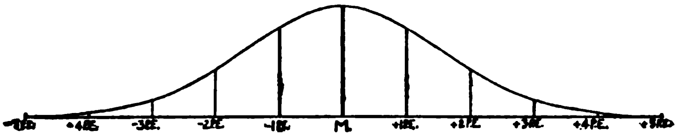

FIG. 16. Normal Surface of Frequency, with P.E. Distances from Median.

to the base at that point would so divide the distribution that 25 per cent of all frequencies would lie between that line and the median; if we pass on to a point 2 P.E. from the median, 41.13 per cent of the cases would lie between the perpendicular and the median; at 3 P.E. from the median, 47.85 per cent of all cases are between the perpendicular and the median; and at 4 P.E. from the median, 49.65 per cent of the surface lies between the perpendicular and the median. Theoretically, the curve and the base-line do not meet but continue to approach each other as the distance from the median becomes greater. For practical purposes, however, we may consider that they meet at about 4.6 P.E. from the median, for a perpendicular drawn here cuts off only 0.1 per cent of all the surface.

3. SCALING THE SENTENCES OF SCALE A FOR EACH GRADE

Having adopted the P.E. of a grade as the unit of measurement, and having assumed that the normal surface of frequency represents the distribution of completion-test ability in any given grade, we may now attempt to arrange our sentences upon a P.E. scale for each grade.

Table XI gives the total number of points score made in each elementary grade upon each sentence of Language Scale A, and the score that would have been made on any given sentence if every child in a grade had succeeded in completing it perfectly.

Table XI indicates that Sentence No. 2, "The sky................ blue," was given 1798 points out of a possible 2636 in the second grade, 2597 out of a possible 2874 points in the third grade, etc. Turned into per cents, sentence No. 2 made 68.21 per cent of the total score possible for it in the second grade, 90.36 per cent in the third grade, etc. Since the number of children tested was different in each grade, it will be necessary thus to reduce all scores to percentages in order that the surfaces of distribution may all be of the same area. The scores shown in Table XI are given in percentages by Table XII.

TABLE XI

Score Made by Each Elementary Grade on Each Sentence of Language Scale A

Sentence No.		Grade II	Grade III	Grade IV	Grade V	Grade VI	Grade VII	Grade VIII
Graded Series	Scale A							
2	2x	1798	2597	2760	2884	2752	2825	2766
4	2y	1834	2660	2813	2957	2865	2885	2818
7	3x	575	1594	2247	2668	2750	2854	2801
11	3y	568	1612	2274	2704	2747	2806	2791
22	4x	*131	714	1655	2381	2568	2797	2781
29	4y	192	961	1787	2470	2650	2766	2790
23	5x	*85	689	1313	1881	2150	2405	2528
24	5y	*97	554	1078	1775	2131	2408	2565
27	6x	*49	487	967	1329	1542	1833	1943
31	6y	*30	384	999	1317	1721	1950	2050
28	7x	*29	258	663	1090	1477	1790	1925
30	7y	*12	235	676	1105	1455	1775	1987
37	8x	*3	61	347	652	1027	1464	1573
34	8y	*6	135	431	753	1181	1525	1771
36	9x		6	51	170	439	916	1244
43	9y		2	35	168	455	917	1272
41	10x		3	94	293	550	925	1280
45	10y		3	24	93	241	432	749
49	11x			3	33	111	379	695
52	11y			8	18	71	290	580
53	12x			1	12	36	120	302
55	12y			2	11	25	108	242
54	13x			3	5	17	45	141
56	13y				3	11	35	103
No. tested		1318	1437	1463	1507	1454	1456	1427
		*1029						
Perfect Score		2636	2874	2926	3014	2908	2912	2854
		*2058						

A sentence like No. 36, which no one of the 1318 children in the second grade was able to complete, is very evidently too difficult for second grade pupils. Just how much too difficult it is we do not know, but if we assume the normal surface of frequency we know that it is more than 4.6 P.E. above their median, for if it were nearer to the second grade median than that distance, it would probably have received a score in this grade. As it is, the entire surface of the second grade distribution lies below sentence No. 36. A sentence receiving a score of 25 per cent in the second grade would be just 25 per cent or 1 P.E. too difficult for

TABLE XII

PER CENT THAT SCORE MADE BY EACH ELEMENTARY GRADE IS OF PERFECT SCORE FOR EACH SENTENCE OF LANGUAGE SCALE A

Sentence No.		Grade II	Grade III	Grade IV	Grade V	Grade VI	Grade VII	Grade VIII
2	2x	68.21	90.36	94.32	95.68	94.64	97.01	96.92
4	2y	69.57	92.55	96.14	98.19	98.52	99.07	98.74
7	3x	21.82	55.46	76.79	88.52	94.57	98.01	98.14
11	3y	21.55	56.09	77.72	89.71	94.46	96.36	97.79
22	4x	6.37	24.85	56.63	78.99	88.33	96.05	97.44
29	4y	7.29	33.44	61.07	81.95	91.13	94.99	97.76
23	5x	4.13	23.98	44.87	62.41	73.93	82.59	88.58
24	5y	4.72	19.28	36.85	58.89	73.28	82.69	89.88
27	6x	2.39	16.95	33.05	44.09	53.03	62.95	68.08
31	6y	1.46	13.36	34.15	43.70	59.18	66.96	71.83
28	7x	1.41	8.98	22.66	36.17	50.79	61.47	67.45
30	7y	.59	8.18	23.11	36.67	50.03	60.95	69.62
37	8x	.15	2.12	11.86	21.63	35.32	50.27	55.12
34	8y	.29	4.70	14.73	24.98	40.61	52.37	62.05
36	9x		.21	1.75	5.64	15.10	31.46	43.59
43	9y		.07	1.20	5.58	15.65	31.49	44.57
41	10x		.11	3.21	9.72	18.91	31.76	44.86
45	10y		.11	.86	3.09	8.29	14.84	26.24
49	11x			.11	1.10	3.82	13.02	24.35
52	11y			.27	.60	2.44	9.96	20.32
53	12x			.03	.40	1.24	4.12	10.58
55	12y			.07	.37	.86	3.71	8.48
54	13x			.11	.17	.58	1.55	4.94
56	13y				.14	.38	1.21	3.61

the median second grade pupil. Sentence No. 2, which received a score of 68.21 per cent in the second grade, is just 18.21 per cent too easy (68.21 − 50.00 = 18.21) for the median child in this grade. Reference to Table XIII,[1] which gives the P.E. values of each tenth of a per cent from 0.0 to 49.9 above or below 50 per cent, indicates that 18.21 per cent difference is equal to .702 P.E. We may therefore locate sentence No. 2 with reference to the second grade median as at −.702. Sentence No. 4, having a 69.57 per cent score, is just 19.57 per cent too easy (69.57 − 50.00 = 19.57) for the median second grade child, and reference to Table XIII locates the sentence at a distance of .759 P.E. from the median. Since it is too easy for the median child, the sentence will be below the second grade median, or exactly −.759.

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[1] Table XIII is taken directly from B. R. Buckingham's Spelling Ability (Table XLVII). It is a modification of the table given in E. L. Thorndike's Mental and Social Measurements (page 200).

TABLE XIII

P.E. Values Corresponding to Given Per Cents of the Normal Surface of Frequency, Per Cents Being Taken From the Median

%	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
0	.000	.004	.007	.011	.015	.019	.022	.026	.030	.033
1	.037	.041	.044	.048	.052	.056	.059	.063	.067	.071
2	.074	.078	.082	.085	.089	.093	.097	.100	.104	.108
3	.112	.115	.119	.123	.127	.130	.134	.138	.141	.145
4	.149	.153	.156	.160	.164	.168	.172	.175	.179	.183
5	.187	.190	.194	.198	.201	.205	.209	.213	.216	.220
6	.224	.228	.231	.235	.239	.243	.246	.250	.254	.258
7	.261	.265	.269	.273	.277	.280	.284	.288	.292	.296
8	.299	.303	.307	.311	.315	.318	.322	.326	.330	.334
9	.337	.341	.345	.349	.353	.357	.360	.364	.368	.372
10	.376	.380	.383	.387	.391	.395	.399	.403	.407	.410
11	.414	.418	.422	.426	.430	.434	.437	.441	.445	.449
12	.453	.457	.461	.464	.468	.472	.476	.480	.484	.489
13	.492	.496	.500	.504	.508	.512	.516	.519	.523	.527
14	.531	.535	.539	.543	.547	.551	.555	.559	.563	.567
15	.571	.575	.579	.583	.588	.592	.596	.600	.603	.608
16	.612	.616	.620	.624	.628	.632	.636	.640	.644	.648
17	.652	.656	.660	.665	.669	.673	.677	.681	.685	.689
18	.693	.698	.702	.706	.710	.714	.719	.723	.727	.731
19	.735	.740	.744	.748	.752	.756	.761	.765	.769	.773
20	.778	.782	.786	.790	.795	.799	.803	.807	.812	.816
21	.820	.825	.829	.834	.838	.842	.847	.851	.855	.860
22	.864	.869	.873	.878	.882	.886	.891	.895	.900	.904
23	.909	.913	.918	.922	.927	.931	.936	.940	.945	.949
24	.954	.958	.963	.968	.972	.977	.982	.986	.991	.996
25	1.000	1.005	1.009	1.014	1.019	1.024	1.028	1.033	1.038	1.042
26	1.047	1.052	1.057	1.062	1.067	1.071	1.076	1.081	1.086	1.091
27	1.096	1.101	1.105	1.110	1.115	1.120	1.125	1.130	1.135	1.140
28	1.145	1.150	1.155	1.160	1.165	1.170	1.176	1.181	1.186	1.191
29	1.196	1.201	1.206	1.211	1.217	1.222	1.227	1.232	1.238	1.243
30	1.248	1.253	1.259	1.264	1.269	1.275	1.279	1.286	1.291	1.296
31	1.302	1.307	1.313	1.318	1.324	1.329	1.335	1.340	1.346	1.351
32	1.357	1.363	1.368	1.374	1.380	1.386	1.391	1.397	1.403	1.409
33	1.415	1.421	1.427	1.432	1.438	1.444	1.450	1.456	1.462	1.469
34	1.475	1.481	1.487	1.493	1.499	1.506	1.512	1.518	1.524	1.531
35	1.537	1.543	1.549	1.556	1.563	1.569	1.576	1.582	1.589	1.595
36	1.602	1.609	1.616	1.622	1.629	1.636	1.643	1.649	1.656	1.663
37	1.670	1.677	1.685	1.692	1.699	1.706	1.713	1.720	1.728	1.735
38	1.742	1.749	1.757	1.765	1.772	1.780	1.788	1.795	1.803	1.811
39	1.819	1.827	1.835	1.843	1.851	1.859	1.867	1.875	1.884	1.892
40	1.900	1.909	1.918	1.926	1.935	1.944	1.953	1.962	1.971	1.979
41	1.988	1.997	2.007	2.016	2.026	2.035	2.044	2.054	2.064	2.074
42	2.083	2.093	2.103	2.114	2.124	2.134	2.145	2.155	2.166	2.177
43	2.188	2.199	2.211	2.222	2.234	2.245	2.257	2.269	2.281	2.293
44	2.305	2.318	2.331	2.344	2.357	2.370	2.384	2.397	2.411	2.425
45	2.439	2.453	2.468	2.483	2.498	2.514	2.530	2.546	2.562	2.579
46	2.597	2.614	2.631	2.648	2.667	2.686	2.706	2.726	2.746	2.767
47	2.789	2.811	2.834	2.857	2.881	2.905	2.932	2.958	2.986	3.015
48	3.044	3.077	3.111	3.146	3.182	3.219	3.258	3.300	3.346	3.395
49	3.450	3.506	3.571	3.643	3.725	3.820	3.938	4.083	4.275	4.600
%	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9

Table XIV shows the differences between 50 per cent (or the grade median) and the percentages given in Table XII. Table XV shows the P.E. equivalents of these differences shown in Table XIV, or the location of each sentence of Scale A with reference to the median of each elementary grade.

TABLE XIV

Difference Between Fifty Per Cent and Per Cent of Perfect Score Made By Each Elementary Grade for Each Sentence of Language Scale A

Sentence No.		Grade II	Grade III	Grade IV	Grade V	Grade VI	Grade VII	Grade VIII
2	2x	18.21	40.36	44.32	45.68	44.64	47.01	46.92
4	2y	19.57	42.55	46.14	48.19	48.52	49.07	48.74
7	3x	−28.18	5.46	26.79	38.52	44.57	48.01	48.14
11	3y	−28.45	6.09	27.72	39.71	44.46	46.36	47.79
22	4x	−43.63	−25.15	6.63	28.99	38.31	46.05	47.44
29	4y	−42.71	−16.56	11.07	31.95	41.13	44.99	47.76
23	5x	−45.87	−26.02	− 5.13	12.41	23.93	32.59	38.58
24	5y	−45.28	−30.72	−13.15	8.89	23.28	32.69	39.88
27	6x	−47.61	−33.05	−16.95	− 5.91	3.03	12.95	18.08
31	6y	−48.54	−36.64	−15.85	− 6.30	9.18	16.96	21.83
28	7x	−48.59	−41.02	−27.34	−13.83	0.79	11.47	17.45
30	7y	−49.41	−41.82	−26.89	−13.33	0.03	10.95	19.62
37	8x	−49.85	−47.88	−38.14	−28.37	−14.68	0.27	5.12
34	8y	−49.71	−45.30	−35.27	−25.02	− 9.39	2.37	12.05
36	9x		−49.79	−48.25	−44.36	−34.90	−18.54	− 6.41
43	9y		−49.93	−48.80	−44.42	−34.35	−18.51	− 5.43
41	10x		−49.89	−46.79	−40.28	−31.09	−18.24	− 5.14
45	10y		−49.89	−49.14	−46.91	−41.71	−35.16	−23.76
49	11x			−49.89	−48.90	−46.18	−36.98	−25.65
52	11y			−49.73	−49.40	−47.56	−40.04	−29.68
53	12x			−49.97	−49.60	−48.76	−45.88	−39.42
55	12y			−49.93	−49.63	−49.14	−46.29	−41.52
54	13x			−49.89	−49.83	−49.42	−48.45	−45.06
56	13y				−49.86	−49.62	−48.79	−46.39

The figures shown in Table XV form for each elementary grade the final measure of the difficulty of any given sentence for that grade. If it were not desirable to show the difficulty of each sentence for all grades together, we might use the values of Table XV without making any further changes in them. Indeed, if any person desires to know the difficulty of any sentence in Scale A for the fifth grade or for any other elementary grade, Table XV gives the necessary data.

The measurement of the difficulty of these sentences in the

TABLE XV

P.E. EQUIVALENT OF DIFFERENCE BETWEEN 50 PER CENT AND PER CENT OF PERFECT SCORE MADE BY EACH ELEMENTARY GRADE FOR EACH SENTENCE OF LANGUAGE SCALE A

Sentence No.		Grade II	Grade III	Grade IV	Grade V	Grade VI	Grade VII	Grade VIII
2	2x	-.702	-1.931	-2.347	-2.543	-2.389	-2.791	-2.769
4	2y	-.759	-2.140	-2.621	-3.107	-3.227	-3.489	-3.318
7	3x	1.154	-.203	-1.086	-1.782	-2.380	-3.047	-3.091
11	3y	1.168	-.228	-1.131	-1.876	-2.365	-2.659	-2.983
22	4x	2.261	1.007	-.247	-1.196	-1.766	-2.605	-2.891
29	4y	2.156	.634	-.417	-1.354	-2.000	-2.438	-2.975
23	5x	2.574	1.048	.191	-.468	-.951	-1.391	-1.786
24	5y	2.480	1.287	.498	-.334	-.921	-1.396	-1.890
27	6x	2.935	1.418	.650	.220	-.113	-.491	-.697
31	6y	3.235	1.645	.605	.235	-.344	-.650	-.857
28	7x	3.254	1.990	1.112	.524	-.030	-.433	-.671
30	7y	3.734	2.066	1.091	.505	-.001	-.412	-.762
37	8x	4.437	3.009	1.752	1.164	.558	-.010	-.191
34	8y	4.102	2.483	1.554	1.001	.353	-.088	-.455
36	9x		4.256	3.129	2.352	1.531	.716	.239
43	9y		4.720	3.346	2.360	1.495	.715	.202
41	10x		4.568	2.744	1.924	1.307	.704	.192
45	10y		4.568	3.532	2.769	2.055	1.547	.943
49	11x			4.567	3.395	2.628	1.669	1.031
52	11y			4.151	3.725	2.921	1.904	1.231
53	12x			4.880	3.938	3.328	2.576	1.853
55	12y			4.720	3.982	3.532	2.646	2.037
54	13x			4.567	4.372	3.744	3.200	2.447
56	13y				4.475	3.967	3.341	2.665

higher grades is made in exactly the same manner as it was made in the elementary grades: the score on each sentence is turned into percentages of the perfect score, the differences between these percentages and 50 per cent being then turned into P.E. differences by means of Table XIII. This assumes, of course, that ability to complete sentences is distributed according to the normal surface of frequency in each higher grade. The score and the P.E. distances from the medians are given in Table XVI for the eighth grade and high school classes in those school systems where the writer was able to test both the elementary and high school classes. The same facts are shown for the group of graduate students at Teachers College.

TABLE XVI

SCORE AND P.E. EQUIVALENTS FOR EACH SENTENCE OF LANGUAGE SCALE A IN THE HIGHER GRADES (COMPLETE SYSTEM GROUP)

Sentence No.	Grade VIII		Grade IX		Grade X		Grade XI		Grade XII		College Graduates	
	Score	P.E.	Score	P.E.	Score	P.E.	Score	P.E.	Score	P.E.	Score	P.E.
2	421	−2.470	541	−3.495	334	−2.953	271	−3.983	206	?	220	−2.684
4	431	−2.908	534	−2.986	340	−3.735	270	−3.614	202	−3.064	228	?
7	435	−3.190	531	−2.846	340	−3.735	261	−2.586	206	?	226	−3.519
11	430	−2.852	526	−2.652	337	−3.235	259	−2.471	205	−3.832	227	−3.891
22	426	−2.663	538	−3.235	333	−2.874	272	?	205	−3.832	228	?
29	433	−2.032	538	−3.235	336	−3.125	260	−3.395	206	?	228	?
23	373	−1.499	496	−1.974	308	−1.905	242	−1.817	185	−1.885	224	−3.125
24	390	−1.760	483	−1.769	314	−2.065	261	−2.586	192	−2.211	223	−2.989
27	285	− .550	404	− .954	291	−1.543	244	−1.875	180	−1.698	212	−2.186
31	327	− .953	443	−1.309	288	−1.487	252	−2.150	191	−2.157	210	−2.093
28	296	− .651	390	− .839	269	−1.178	223	−1.357	167	−1.305	186	−1.334
30	304	− .726	409	− .996	266	−1.134	223	−1.357	177	−1.597	208	−2.010
37	244	−1.95	358	− .595	251	− .927	187	− .725	164	−1.227	193	−1.515
34	239	−1.52	346	− .507	269	−1.179	220	−1.295	179	−1.663	205	−1.893
36	161	+ .515	289	− .109	209	− .418	188	− .741	149	− .879	192	−1.488
43	165	+ .479	321	− .330	222	− .567	201	− .949	149	− .879	215	−2.344
41	144	+ .670	275	− .014	218	− .521	168	− .444	159	−1.104	190	−1.434
45	102	+1.092	210	+ .435	165	+ .065	167	− .429	126	− .420	189	−1.409
49	76	+1.403	188	+ .595	160	+ .120	131	+ .068	129	− .477	187	−1.358
52	44	+1.904	143	+ .945	157	+ .153	140	− .055	119	− .291	204	−1.857
53	19	+2.546	92	+1.424	110	+ .687	106	+ .415	88	+ .272	145	− .516
55	23	+2.411	62	+1.777	97	+ .849	94	+ .590	78	+ .459	149	− .585
54	11	+2.908	44	+2.078	61	+1.366	71	+ .949	40	+1.278	136	− 3.62
56	11	+2.908	26	+2.474	29	+2.037	45	+1.441	41	+1.253	105	+ .147
No of Pupils.	221		273		171		136		103		114	
Perfect Score .	442		546		342		272		206		228	

4. MEASUREMENT OF THE DISTANCES BETWEEN GRADES

There are a number of ways in which the P.E. distances between consecutive grades can be measured. Three methods have been used in this study and the average of the three has been taken as the most probably true measure of the distance in each case.

We have assumed that the ability to complete sentences is distributed in any given grade in accordance with the normal surface of frequency. The assumption was also made, although it was not clearly stated, that each sentence to be completed is a test of ability to complete sentences, and that ability to complete individual sentences is distributed "normally." The difference between two consecutive grades may therefore be measured by the difference in the positions with reference to the two grade medians held by any given sentence. For example, sentence

No. 2 was, according to Table XV, .702 P.E. below the second grade median and 1.931 P.E. below the third grade median, which makes a difference of 1.229 P.E. between the medians of the second and third grades. This method of determining the differences gives us a large number of direct measurements. Table XVII gives these sentence measurements of the intervals between the consecutive elementary grades.

TABLE XVII

P.E. INTERVALS SHOWN BETWEEN CONSECUTIVE ELEMENTARY GRADES BY EACH SENTENCE OF LANGUAGE SCALE A

Sentence No.		Interval II–III	Interval III–IV	Interval IV–V	Interval V–VI	Interval VI–VII	Interval VII–VIII
2	2x	1.229	.416	.196	–.154	.402	–.022
4	2y	1.381	.481	.486	.120	.262	–.171
7	3x	1.357	.883	.696	.598	.667	.044
11	3y	1.396	.903	.745	.489	.294	.324
22	4x	1.254	1.254	.949	.570	.839	.286
29	4y	1.522	1.051	.937	.646	.438	.537
23	5x	1.526	.857	.659	.483	.440	.395
24	5y	1.193	.789	.832	.587	.475	.494
27	6x	1.517	.768	.430	.333	.378	.206
31	6y	1.590	1.040	.370	.579	.306	.207
28	7x	1.264	.878	.588	.554	.403	.238
30	7y	1.668	.975	.586	.506	.411	.350
37	8x	1.428	1.257	.588	.606	.568	.181
34	8y	1.619	.929	.553	.648	.441	.367
36	9x		1.127	.777	.821	.815	.477
43	9y		1.374	.986	.865	.780	.513
41	10x		1.824	.820	.617	.603	.512
45	10y		1.036	.763	.714	.508	.604
49	11x			1.172	.767	.959	.638
52	11y			.426	.804	1.017	.673
53	12x			.942+	.610	.752	.723
55	12y			.738+	.450	.886	.609
54	13x			.195	.628	.544	.753
56	13y				.508	.626	.676
Average...		1.425	.991	.671	.556	.576	.401

A general tendency will be noticed in Table XVII for the large differences between grades to appear in the harder sentences. I have grouped the measurements of each interval, putting in one group those measurements of the interval shown in Table XVII which were obtained from values lower than –1.5 P.E. in Table XV, in a second group those obtained from values between -1.5 and 1.5 P.E., and in a third group those measurements obtained from positive values larger than 1.5 P.E. The average of each group of measurements for each interval is given below in Table XVIII.

TABLE XVIII

AVERAGES OF GROUPS OF DETERMINATIONS OF INTER-GRADE INTERVALS AS MEASURED BY SENTENCES OF LANGUAGE SCALE A

Group	Interval II–III	Interval III–IV	Interval IV–V	Interval V–VI	Interval VI–VII	Interval VII–VIII
Below -1.5	1.305	.448	.531	.378	.484	.236
-1.5 to 1.5	1.376	.929	.669	.537	.511	.339
Above 1.5	1.558	1.160	.724	.678	.756	.668

Table XVIII throws some very interesting light upon the question of how two grades differ in ability. Evidently one grade is better than the grade below both in the difficult and the easy tests, but the large differences are in the hard tests. An eighth grade child differs from a seventh grade child more distinctly in doing difficult tasks than in doing tasks that are moderately easy for both. At any rate, it appears that the child in the higher grade shows his superiority in doing harder tests rather than in doing the easy tests.

It hardly seems just to allow the intervals between grades to be influenced equally by sentences near the medians of the two grades concerned and by other sentences at the extreme ranges of the distributions. The sentences near the medians are more reliable measures and should probably be weighted, while those sentences which are more than 3 or 4 P.E. from the interval should possibly not be allowed to influence the measure of the interval at all, because at that extreme range caprice and accident have undue influence. It also seems unfair, in view of the facts shown in Table XVIII, to allow the easy sentences to have the same amount of influence as the more difficult in determining the intervals between grades. The plan that has been followed here has been to allow equal weight to all measures of the interval by sentences not more than 2 P.E. below the lower grade of the pair nor more than 4 P.E. above the higher grade of the pair whose distance from each other is being measured. The average of the measurements by sentences in Table XVII, which lie within this range, are given below.

Grade Interval....	II–III	III–IV	IV–V	V–VI	VI–VII	VII–VIII
P.E. Interval......	1.408	.965	.705	.620	.606	.479

The intervals between the higher grades derived from the sentence locations given in Table XVI are shown in Table XIX, with the average of the determinations from sentences within the range −2 P.E. to +4 P.E.

TABLE XIX

P. E. INTERVALS SHOWN BETWEEN CONSECUTIVE HIGHER GRADES BY EACH SENTENCE OF LANGUAGE SCALE A. (COMPLETE SYSTEM GROUP)

Sentence No.	Interval[1] VIII–IX	Interval IX–X	Interval X–XI	Interval XI–XII	Interval XII–C.G.
2	1.025	−.542	1.030		
4	.078	.749	−.121	−.550	
7	−.344	.889	−1.149		
11	−.200	.583	−.764	1.361	.059
22	.572	−.993			
29	1.203	−.110	.270		
23	.475	−.069	−.088	.068	1.240
24	.009	.296	.521	−.375	.778
27	.404	.589	.332	−.177	.488
31	.356	.178	.663	.007	−.064
28	.188	.339	.179	−.052	.029
30	.270	.138	.223	.240	.413
37	.400	.332	−.202	.502	.288
34	.355	.672	.116	.368	.230
36	.624	.309	.323	.138	.609
43	.809	.237	.382	−.070	1.465
41	.684	.507	−.077	.660	.330
45	.657	.370	.494	−.009	.989
49	.808	.475	.052	.545	.881
52	.959	.792	.208	.236	1.566
53	1.122	.737	.272	.143	.788
55	.634	.928	.259	.131	1.044
54	.830	.712	.417	−.329	1.640
56	.434	.437	.596	.188	1.106
Weighted Average......	.556	.484	.265	.192	.813

Table XIX has the disadvantage of being based upon the small number of pupils tested in those school systems where both elementary and high school grades were measured. Six sentences included in this group were also included in some tests given in three large city high schools, so that it is possible to get from them a measure of the differences between high school grades based upon a larger number of pupils, although upon a smaller number of sentences.

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[1] In each of the methods used to determine the intervals between consecutive grades, the difference between the eighth grade and the first year high school grade has been based upon the difference found in those school systems where both elementary and high school classes were tested.

Table XX gives the score and P.E. equivalents for these six sentences in the high school grades.

TABLE XX

SCORE AND P.E. EQUIVALENTS FOR SIX SENTENCES IN THE HIGHER GRADES

Sentence No.	Grade IX		Grade X		Grade XI		Grade XII		Col. Grads.	
	Score	P.E.	Score	P.E.	Score	P.E.	Score	P.E.	Score	P.E.
37	692	−.548	560	−.763	630	−.653	544	− .805	193	−1.515
36	575	−.132	542	−.669	630	−.653	587	−1.059	192	−1.488
45	403	.471	388	.065	491	−.083	468	− .406	189	−1.409
49	335	.727	378	.111	489	−.075	477	− .451	187	−1.358
55	124	1.777	190	1.065	293	.728	320	.316	149	− .585
54	53	2.447	101	1.702	142	1.531	157	1.227	136	− .362
No. tested....	537		402		470		385		114	

The averages of the six determinations from Table XX of the intervals between grades, I have calculated to be as shown in the second line below.

	IX–X	X–XI	XI–XII	XII–C.G.
Language Scale A.......	.484	.265	.192	.813
Six Sentences...........	.538	.119	.329	.923
Average to use.........	.511	.192	.260	.868

The third line shows the intervals which will be used as probably the most accurate determinations from sentences.

A second method of determining the intervals between grade medians makes use of the quartile as a measure of the P.E. If Scale A were perfect and if the surfaces of distribution in Figs. 8 to 14 were perfectly normal, the quartile, which is half of the range of the middle 50 per cent, would have been exactly the same as the P.E. Since we are assuming in the other determinations that completion-test surfaces of distribution are approximately normal, no great error will result from doing so in this case. I have therefore averaged the quartiles of each two consecutive grades and used this average as a diviser of the crude score interval between the grade medians. Table XXI shows the result upon the data furnished by Table I.

TABLE XXI

Determination of the Quartile Intervals Between Elementary Grades

	Grade II	Grade III	Grade IV	Grade V	Grade VI	Grade VII	Grade VIII
Median Score ...	4.5912	8.9864	14.3287	18.3888	21.9175	25.2719	28.0598
Quartile	2.0848	3.4127	4.1567	3.6140	3.6098	3.7496	4.0412

Score Interval.......	4.3952	5.3423	4.0601	3.5287	3.3544	2.7879
Average Quartile	2.7487	3.7847	3.8858	3.6119	3.6797	3.8954
Quartile Interval	1.5990	1.4115	1.0450	.9769	.9116	.7157

Table XXII furnishes the same information regarding the quartile intervals between the higher grades, from the data given in Table III.

TABLE XXII

Determination of the Quartile Intervals Between Higher Grades (Complete System Group)

	Grade VIII	Grade IX	Grade X	Grade XI	Grade XII	College Graduates
Median Score.....	27.8611	30.1470	33.6818	35.7272	37.1666	42.8125
Quartile..........	3.6882	4.2317	3.8992	3.3718	3.8437	2.8660

Score Interval.........	2.2859	3.5348	2.0454	1.4394	5.6459
Average Quartile	3.9599	4.0654	3.6355	3.6077	3.3548
Quartile Interval	.5772	.8695	.5626	.3989	1.6829

The third measurement of the differences between successive grades is also based upon the distribution of scores in Language Scale A. It will be observed in Table I that many second grade pupils received scores greater than the median score for the third grade, and that many third grade pupils received lower scores than the median second grade score. Between the third grade median, which is 8.9864, and the second grade median, which is 4.5912, there are (if we assume that the scores of the children recorded as making a given score are spread evenly over that step) 531.96 of the 1318 individuals in the second grade distribution and 545.58 of the 1437 individuals in the third grade distribution. In terms of percentages, 37.96 per cent of the third grade distribution and 40.36 per cent of the second grade distribution lie between the medians of these two grades. Each of these percentages is a percentage from the median of the distribution and may therefore be turned at once into a P.E. value by means of Table XIII. This transmutation reveals a difference between the medians of the second and third grades of 1.931 P.E. when measured by the second grade distribution, and 1.739 when measured by the third grade distribution.

It is also possible by this method to obtain certain indirect measures of the same distances. 47.66 per cent of the fourth grade distribution, for example, lies between the fourth grade median and the second grade median, so we may say (from Table XIII) that in so far as it is measured directly by the fourth grade distribution the second grade median is 2.948 P. E. below the median of the fourth grade. In the same way, 31.55 per cent of the fourth grade distribution lies between the median for that grade and the median for the third grade, which makes a P.E. difference of 1.332 between the two grades. From the median of the fourth grade distribution, then, we have found it to be 2.948 P.E. to the second and 1.332 P.E. to the third grade median, and by subtraction this gives us a difference between the second and third grade medians of 1.616 P.E.

It would be possible, of course, to derive indirect measures of each interval from any distribution of scores which covers the interval, but it would be unfair to allow these indirect measurements, especially those which are very near the extreme ranges of a distribution, to have the same influence as the direct measurements. Since the intervals have already been determined by two other methods, it seemed best to give full weight here to direct determinations by this method and one-half weight to the indirect determinations obtained from the distribution next above the pair furnishing direct determinations and one-half weight to the indirect determination obtained from the distribution next below the direct pair.

Table XXIII gives for each elementary grade distribution the percentages of the distribution lying between its median and the medians of the two grades lower and of the two grades higher, and the P.E. equivalents of these percentages as taken from Table XIII.

TABLE XXIII

PERCENTAGES OF EACH ELEMENTARY GRADE DISTRIBUTION LYING BETWEEN ITS MEDIAN AND THE MEDIANS OF NEIGHBORING GRADES, WITH P.E. EQUIVALENTS

To Median of Grade	Percentages and Equivalents of Percentages of Distribution of							
	Grade II	Grade III	Grade IV	Grade V	Grade VI	Grade VII	Grade VIII	Grade IX
II		37.96% 1.739	47.66% 2.948					
III	40.36% 1.931		31.55% 1.332	46.70% 2.726				
IV	48.30% 3.146	30.45% 1.272		28.07% 1.148	40.82% 1.973			
V		43.43% 2.237	23.94% .951		23.62% .937	38.91% 1.812		
VI			39.33% 1.845	24.35% .970		23.13% .910	36.28% 1.621	
VII				40.15% 1.914	24.60% .982		19.14% .742	30.16% 1.257
VIII					37.82% 1.729	18.78% .726		13.04% .494

As indicated above, the direct determinations are given twice as much weight in this study as the indirect values, and the only indirect values used are those from the distributions immediately above and below the grades concerned. Table XXIV shows the values used.

TABLE XXIV

DETERMINATIONS OF THE INTER-GRADE INTERVALS OBTAINED FROM OVERLAPPING OF DISTRIBUTIONS OF SCORES ON LANGUAGE SCALE A

Determination	II–III	III–IV	IV–V	V–VI	VI–VII	VII–VIII
Lower Indirect. .		1.215	.965	.894	.944	.747
Lower Direct . . .	1.931	1.272	.951	.970	.982	.726
	1.931	1.272	.951	.970	.982	.726
Upper Direct . . .	1.739	1.332	1.148	.937	.910	.742
	1.739	1.332	1.148	.937	.910	.742
Upper Indirect. .	1.616	1.578	1.036	.902	.879	.763
Average.	1.7912	1.3335	1.0331	.9350	.9345	.7410

Table XXV gives data similar to Table XXIII but with reference to the higher grades in those schools where the entire school system was tested. The distributions of scores in Language Scale A upon which Table XXV is based will be found in Table III.

TABLE XXV

PERCENTAGES OF EACH HIGHER GRADE DISTRIBUTION LYING BETWEEN ITS MEDIAN AND THE MEDIANS OF NEIGHBORING GRADES, WITH P.E. EQUIVALENTS

To Median of Grade	Distribution of						
	Grade VII	Grade VIII	Grade IX	Grade X	Grade XI	Grade XII	Grade C.G
VIII	17.12% .657		14.44% .549	36.03% 1.604			
IX	29.13% 1.203	16.29% .624		24.65% .984	32.65% 1.394		
X		35.49% 1.568	20.39% .795		16.04% .614	21.75% .853	
XI			31.32% 1.319	10.36% .389		9.13% .342	40.43% 1.938
XII				16.77% .643	7.23% .270		35.38% 1.561
C.G.					41.63% 2.047	33.92% 1.470	

The averages of the weighted direct values and the unweighted indirect values obtained from Table XXV, as illustrated in Table XXIV, are as follows:

Interval	VIII-IX	IX-X	X-XI	XI-XII	XII-C.G.
Average	.5853	.8803	.5068	.3091	1.5678

Half of the sentences in Language Scale A were included in a test given in two high schools where the elementary grades had not been tested. The sentences included in this high school test were selected, one sentence from each grade-pair in Scale A, so that the entire test had practically the same difficulty but was just half as long as Language Scale A. By going through the records and finding what score each student in the higher grades would have made if tested on these twelve sentences only, I was able to get a distribution of scores in each of these higher grades which had the advantage of larger numbers of pupils, although there were fewer sentences. Table XXVI shows the total dis-

TABLE XXVI

DISTRIBUTION OF SCORES MADE IN HIGH SCHOOL HALF TEST

Score	Grade IX	Grade X	Grade XI	Grade XII	Col. Grads.
24		3	2	5	13
23	1	6	1	6	17
22	1	8	16	12	23
21	10	9	14	19	13
20	9	11	34	24	15
19	15	24	42	28	12
18	27	17	53	33	11
17	29	22	31	27	6
16	24	30	34	19	2
15	24	25	39	31	....
14	32	17	21	12	....
13	32	15	17	11	1
12	24	10	15	6	....
11	21	8	12	1	1
10	10	3	4	2	....
9	6	2	2	1	....
8	5	2	2	....	....
7	2	....	1	....	....
6	1	1	....	....	....
5	....	....	....	....	....
4	....	....	....	....	....
3	....	....	....	....	....
2	....	....	....	....	....
1	....	....	....	....	....
0	....	....	....	....	....
No. tested	273	213	340	237	114
Median Score	15.14	16.78	17.74	18.26	21.69

tribution of scores made in this high school half-test by the pupils in Grade IX and above, whether they took it in the short form or as a part of Scale A.

From this table I have worked out the distances between grade medians in exactly the same way as they were derived above, with the following results:

Interval	IX–X	X–XI	XI–XII	XII–C.G.
Average	.6968	.3828	.2458	1.8054

As being probably the truest value for the intervals as determined by this method, I have taken the average of the determination by the small number of pupils with Scale A and the determination by the larger number of pupils with half of Scale A.

Interval	VIII–IX	IX–X	X–XI	XI–XII	XII–C.G.
From Scale A	.5853	.8803	.5068	.3091	1.5678
From half Scale A		.6968	.3828	.2458	1.8054
Av. Determination of Distributions	.5853	.7885	.4448	.2774	1.6866

Values for the intervals between grade medians having now been worked out by three different methods, it is interesting to note that although the three determinations differ somewhat, their general characteristics are the same. It would be difficult to determine which method furnishes the best results. I have simply taken the average of the three results for each interval as the one to be used in this study. The results of each method and the average result are given in Table XXVII.

TABLE XXVII

THREE DETERMINATIONS OF THE INTERVAL BETWEEN SUCCESSIVE GRADES

Method	Interval Between Grades										
	2–3	3–4	4–5	5–6	6–7	7–8	8–9	9–10	10–11	11–12	12–C. G.
Sentence	1.408	.965	.705	.620	.606	.479	.556	.511	.192	.260	.868
Distribution	1.791	1.333	1.033	.935	.934	.741	.585	.788	.445	.277	1.687
Quartile	1.599	1.411	1.045	.977	.912	.716	.577	.869	.563	.399	1.683
Average used as the final measure	1.599	1.237	.928	.844	.817	.645	.573	.723	.400	.312	1.412

5. SELECTION OF A ZERO-POINT FOR COMPLETION-TEST ABILITY

Zero-points are absolute on some scales and arbitrary on others. It would be very hard to select a sentence so easy that to be unable to complete it would signify that one had absolutely no "language ability," so it will be necessary to choose an arbitrary zero-point for these tests if they are to be called "Language Scales." It will still be possible, however, to locate a zero-point which will represent absolute inability to complete any *printed sentence* as difficult as the easiest one used in the tests included in this study.

Reference to Table I shows that 255 of the 1318 children in the second grade made a score of 0 in Scale A, which means that they received no score at all. Between these children and the median of the second grade, however, there were 404 children, which is 30.65 per cent of all in the second grade. Reference to Table XIII shows that a difference of 30.65 per cent from the median of a normal distribution means a distance of 1.283 P.E. If this were our only evidence, therefore, we might locate our arbitrary zero-point at 1.283 P.E. below the median of the second grade.

Table I also shows that 19 of the 1437 pupils in the third grade made a score of zero, while 48.68 per cent scored above zero but below the median of their grade. This would locate the zero-point in Scale A at 3.291 P.E. below the third grade median. We have already determined (Table XXVII) that the third grade median is 1.599 P.E. above the second grade median. The zero-point in Scale A is therefore located by the third grade distribution at 1.692 $(3.291-1.599=1.692)$ P.E. below the second grade median.

The median score of the second grade on Language Scale A is shown by Table I to be 4.5912, and the quartile 2.0848. Assuming that the quartile is equal to the P.E., as it is in a perfectly normal surface of frequency, we find by dividing the score by the quartile that the second grade median is 2.2022 P.E. above zero.

The median score of the third grade is shown by Table I to be 8.9864. Table XXI shows the average of the quartiles of grades II and III to be 2.7487. Dividing the score by this average of the quartiles places the third grade median at 3.2693 P.E. above zero. From this determination, then, zero would be 1.670

(3.269 − 1.599 = 1.670) P.E. below the second grade median. This makes the fourth determination of the distance from zero to the second grade median. The four determinations are as follows:

From the second grade distribution..........	1.283
From the third grade distribution............	1.692
From the second grade score.................	2.202
From the third grade score..................	1.670
Average........	1.712

It would be very convenient in any scale for ability of any sort to have at least one test located exactly one unit above the zero-point. The easiest sentence in Scale A is shown by Table XV to be sentence No. 4, "We are going....................school."

After accepting tentatively the determination just made that the second grade median is 1.712 P.E. above the zero-point, the location above zero of sentence No. 4 was worked out according to the scheme to be described below. It was found that, under these conditions, this sentence No. 4 had a value of 1.018 above zero. This was so near 1.000 that it was decided to employ such a value for the distance between zero and the second grade median as would place sentence No. 4 exactly at 1 P.E. above zero. 1.687 P.E. was found to be such a value. This is only .025 P.E. smaller than the average of the four determinations made above and is probably just as near the true distance.

For the purposes of this study, then, zero will be defined arbitrarily as 1 P.E. below sentence No. 4, or as 1.687 P.E. below the median of the second grade distribution shown in Table I.[1]

Having located our zero-point at 1.687 P.E. below the second grade median, and having previously determined the distances between the medians of each consecutive grade, it is now an easy matter to calculate the distance of each grade above zero. These distances are shown in Table XXVIII.

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[1] It must be borne in mind that this is not a zero-point for language ability or even for completion-test ability, but merely the zero-point for ability to complete the printed sentences used in this study. The zero-point for ability to complete a spoken sentence would probably be found several units below the zero-point used in this study. The absolute zero-point for ability to complete the easiest possible incomplete idea or representation of an object would probably be found still further down on an absolute scale, below even the zero-point for ability to complete a spoken sentence. If scales are ever constructed for these simpler forms of completion test, we may expect the zero-point established in this study to be located several units above the zero-point for these simpler tests.

TABLE XXVIII

DISTANCES ABOVE ZERO OF THE MEDIANS OF EACH SCHOOL GRADE. 1 = P.E.

Grade	Above Zero	Below Next Grade
II	1.687	1.599
III	3.286	1.237
IV	4.523	.928
V	5.451	.844
VI	6.295	.817
VII	7.112	.645
VIII	7.757	.573
IX	8.330	.723
X	9.053	.400
XI	9.453	.312
XII	9.765	1.412
C.G.	11.177	

Fig. 17 (page 55) represents the relations of the grade medians to each other, to the zero-point, and to the distributions of other grades, upon the assumption that ability in each grade is distributed in accordance with the normal surface of frequency, and that the values given in Table XXVIII are substantially correct.

6. REFERRING ALL SENTENCES OF SCALE A TO ZERO

Table XV gave the value of each sentence of Language Scale A for each elementary grade, and Table XVI gave their values for the higher grades. In Table XV, for instance, sentence No. 7 had a positive value of 1.154 in the second grade and a value of −.203 in the third grade. Now we know from Table XXVIII that the second grade median is at 1.687 P.E. and the third grade median at 3.286 P.E. above zero. 1.154 added to 1.687 gives this sentence a value of 2.841 above zero in the second grade, while .203 subtracted from 3.286 gives it a value of 3.083 above zero in the third grade. Table XXIX (page 56) is made from Table XV by employing in this way the values given in Table XXVIII for each grade median.

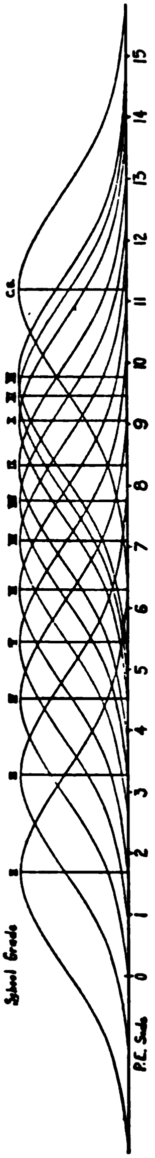

FIG. 17. Relations of Grade Distributions to Each Other.

TABLE XXIX

LOCATION ABOVE ZERO OF EACH SENTENCE OF LANGUAGE SCALE A FOR EACH ELEMENTARY GRADE. 1 = P.E.

Sentence No.		Grade II	Grade III	Grade IV	Grade V	Grade VI	Grade VII	Grade VIII
2	2x	.985	1.355	2.176	2.908	3.906	4.321	4.988
4	2y	.928	1.146	1.902	2.344	3.068	3.623	4.439
7	3x	2.841	3.083	3.437	3.669	3.915	4.065	4.666
11	3y	2.855	3.058	3.392	3.575	3.930	4.453	4.774
22	4x	3.948	4.293	4.276	4.255	4.529	4.507	4.866
29	4y	3.843	3.920	4.106	4.097	4.295	4.674	4.782
23	5x	4.261	4.334	4.714	4.983	5.344	5.721	5.971
24	5y	4.167	4.573	5.021	5.117	5.374	5.716	5.867
27	6x	4.622	4.704	5.173	5.671	6.182	6.621	7.060
31	6y	4.922	4.931	5.128	5.686	5.951	6.462	6.900
28	7x	4.941	5.276	5.635	5.975	6.265	6.679	7.086
30	7y	5.421	5.352	5.614	5.956	6.294	6.700	6.995
37	8x	6.124	6.295	6.275	6.615	6.853	7.102	7.566
34	8y	5.789	5.769	6.077	6.452	6.648	7.024	7.302
36	9x		7.542	7.652	7.803	7.826	7.828	7.996
43	9y		8.006	7.869	7.811	7.790	7.827	7.959
41	10x		7.854	7.267	7.375	7.602	7.816	7.949
45	10y		7.854	8.055	8.220	8.350	8.659	8.700
49	11x			9.090	8.846	8.923	8.781	8.788
52	11y			8.674	9.176	9.216	9.016	8.988
53	12x			9.403	9.389	9.623	9.688	9.610
55	12y			9.243	9.433	9.827	9.758	9.794
54	13x			9.090	9.823	10.039	10.312	10.204
56	13y				9.926	10.262	10.453	10.422
Grade Position..		1.687	3.286	4.523	5.451	6.295	7.112	7.757

Table XXX shows the location above zero of each sentence in Language Scale A for each higher grade in the schools where both elementary and high school classes were tested. Table XXX is derived from Table XVI by employing the grade locations shown in Table XXVIII.

The number of pupils in each of the higher grades which furnished the data for Table XXX was small, and yet these pupils were slightly more able than the pupils in the same grades of the large city high schools where a short completion test was given. This means, probably, that for high school students in general the values assigned in Table XXX are too low.

Six of the sentences actually were included in both sets of tests, and the location of each of these six sentences for each of the higher grades was shown in Table XX. Table XXXI gives the

TABLE XXX

LOCATION ABOVE ZERO OF EACH SENTENCE OF LANGUAGE SCALE A FOR EACH HIGHER GRADE (COMPLETE SYSTEM GROUP.) 1 = P.E.

Sentence No.	Grade IX	Grade X	Grade XI	Grade XII	Grade Col. Gr.
2	4.835	6.100	5.470		8.493
4	5.344	5.318	5.839	6.701	
7	5.484	5.318	6.867		7.658
11	5.678	5.818	6.982	5.933	7.286
22	5.095	6.179	4.853	5.933	
29	5.095	5.928	6.058		
23	6.356	7.148	7.636	7.880	8.052
24	6.561	6.988	6.867	7.554	8.188
27	7.376	7.510	7.578	8.067	8.991
31	7.021	7.566	7.303	7.608	9.084
28	7.491	7.875	8.096	8.460	9.843
30	7.334	7.919	8.096	8.168	9.167
37	7.735	8.126	8.728	8.538	9.662
34	7.823	7.874	8.158	8.102	9.284
36	8.221	8.635	8.712	8.886	9.689
43	8.000	8.486	8.504	8.886	8.833
41	8.316	8.532	9.009	8.661	9.743
45	8.765	9.118	9.024	9.345	9.768
49	8.925	9.173	9.521	9.288	9.819
52	9.275	9.206	9.508	9.474	9.320
53	9.754	9.740	9.868	10.037	10.661
55	10.107	9.902	10.043	10.224	10.592
54	10.408	10.419	10.402	11.043	10.815
56	10.804	11.090	10.894	11.018	11.324

location above zero of each of the six sentences for each high school grade, first as calculated from Table XXX, and second as determined from the larger number of pupils reported in Table XX. Table XXXI also shows the amount of difference between the two values for each sentence and the average amount of difference caused by the larger numbers from the city high schools.

In order to correct the values shown in Table XXX for the slightly extraordinary abilities of the pupils from whom it was

TABLE XXXI

Changes in Values Above Zero of Six Sentences by Use on Larger Numbers of High School Students

H. S. Grade	No. Pupils	Sentence No.						Average Difference
		37	36	45	49	55	54	
IX	273	7.735	8.221	8.765	8.925	10.107	10.408	
	537	7.782	8.198	8.801	9.057	10.107	10.777	
	Diff.	.047	−.023	.036	.132	0	.369	.093
X	171	8.126	8.635	9.118	9.173	9.902	10.419	
	402	8.290	8.384	9.118	9.164	10.118	10.755	
	Diff.	.164	−.251	0	−.009	.216	.336	.076
XI	136	8.728	8.712	9.024	9.521	10.043	10.402	
	470	8.800	8.800	9.370	9.378	10.181	10.984	
	Diff.	.072	.088	.346	−.143	.138	.582	.180
XII	103	8.538	8.886	9.345	9.288	10.224	11.043	
	385	8.960	8.706	9.359	9.314	10.081	10.992	
	Diff.	.422	−.180	.014	.026	−.143	−.051	.014

derived, .09 was added to all values for grade IX, .07 to all grade X values, .15 in grade XI, and the values in grade XII were not changed at all. These corrections were determined by reference to the average differences shown in Table XXXI.

Having now located by each grade the distance above zero for each sentence of Scale A, we may undertake to determine what the location of each sentence is for school children in general. It will be noticed in Table XXIX that there is a tendency for each sentence to have a higher location in the higher grades than it has in the lower grades. This is probably due in part to the presence in these higher grades of a few inferior individuals, who fail to make satisfactory completions of sentences which should be easy for them. It would be unjust, however, to allow the few dull pupils who manage to get into the higher grades to keep on dragging these easy sentences into the higher ranges of the scale. Undoubtedly the most reliable distribution for determining the general difficulty of a sentence is the distribution whose median is nearest to the position of the sentence. I have therefore given double weight to the determinations by those grade distributions whose medians were not more than 1 P.E. from the sentence's location, and single weight to all determinations by grades more than 1 P.E. but less than 2.5 P.E. from the sentence.

Fig. 18 shows how a grade distribution would affect sentences at various distances.

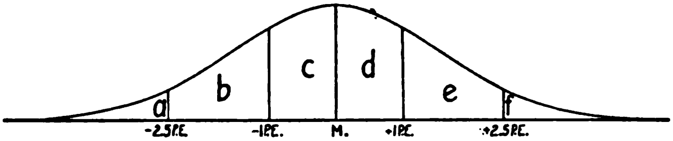

FIG. 18. Showing the Influence Allowed Various Parts of a Distribution in Determining the General Location of a Sentence.

The determination of a distribution is given double weight if its median is within 1 P.E. of a sentence, single weight if more than 1 and less than 2.5 P.E., and no weight at all in the general determination if its median is more than 2.5 P.E. from the sentence. Areas *a* and *f* are not allowed to help determine the general difficulty of a sentence.

Table XXXII shows for the first five sentences the details of just how the weighting was done.

TABLE XXXII

DETERMINATION OF GENERAL LOCATIONS OF SENTENCES

Distribution	Sentences No.				
	2	4	7	11	22
II	.985 .985	.928 .928	2.841	2.855	3.948
III	1.355	1.146	3.083 3.083	3.058 3.058	4.293
IV	2.176		3.437	3.392	4.276 4.276
V			3.669	3.575	4.255
VI			3.915	3.930	4.529
VII					
Average......	1.376	1.000	3.338	3.311	4.263
Use..........	1.38	1.00	3.34	3.31	4.26

Weighting in this manner the values shown in Tables XXIX and XXX (after raising the values of Table XXX by the amounts determined in Table XXXI), the figures obtained to show the general difficulty of each sentence for all grades are shown in Table XXXIII.

TABLE XXXIII

FINAL VALUES OF SENTENCES IN SCALE A

Sentence No.[1]	General Value
4	1.00
2	1.38
11	3.31
7	3.34
29	4.12
22	4.26
23	5.40
24	5.69
31	6.50
27	6.67
30	6.95
28	7.04
34	7.31
37	7.85
43	8.29
36	8.32
41	8.37
45	9.04
49	9.20
52	9.29
53	10.05
55	10.19
54	10.76
56	11.17

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[1] Sentences are here in the order of difficulty, not the order of Scale A.

7. ESTIMATION OF THE DIFFICULTY OF OTHER SENTENCES[1]

Scale A is the basis upon which all values are built in this study. The Graded Series of test sentences was given to a smaller number of children and was not given to the College Graduate group, so there are two corrections to be made in the figures obtained directly from its use: a correction must first be made for any difference in the abilities of the groups which are called by the same grade number, and a second correction must be made in the values of the more difficult sentences for the lack of the College Graduate group. The other lists of tests outside of the Graded Series require the same corrections, except that in the cases of these others the second correction is not simply for the lack of one grade group but for the lack of several such groups.

Lack of sufficient numbers of children tested to actually locate the difficulty of a test can not be corrected, except by testing a sufficient number of children. The writer feels that the irregularities due to small numbers are negligible in the sentences of Scale A, very small in the other sentences of the Graded Series, somewhat larger in the sentences numbered from 57 to 72, and still larger in those sentences numbered higher than 72. For the sentences numbered above 56, it can only be said that their difficulty has been estimated carefully, although much more statistical labor has been spent upon them than upon the sentences of Scale A. To actually measure the difficulty of a sentence requires that it be tried upon hundreds of children in each grade. No amount of calculation can take the place of large numbers of children tested.

Table XXXIV gives the score made upon each sentence of the Graded Series in each school grade. Table XXXV gives the P.E. equivalents of the score, and Table XXXVI gives the resulting location above zero of each sentence.

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[1] Other sentences than those included in the Language Scales are not given in the body of this report, but each sentence used in this investigation, together with the scheme used in scoring it, will be found in the Appendix.

TABLE XXXIV

SCORE MADE BY EACH GRADE ON EACH SENTENCE OF THE GRADED SERIES

Sentence No.	Grade II	Grade III	Grade IV	Grade V	Grade VI	Grade VII	Grade VIII	Grade IX	Grade X	Grade XI	Grade XII
1	990	1397	1357	1467	1142	1207	874	384	241	211	163
2	970	1346	1293	1422	1095	1199	862	381	236	211	166
3	675	1056	1050	1273	1003	1124	832	369	235	200	159
4	967	1382	1303	1466	1134	1213	874	374	240	210	163
5	476	1056	1159	1407	1132	1214	882	383	242	210	164
6	695	1141	1270	1475	1145	1226	888	383	242	212	166
7	300	811	1014	1324	1077	1203	872	373	240	201	166
8	448	924	1053	1370	1076	1177	865	372	240	210	164
9	290	754	886	1230	1014	1114	850	376	235	207	163
10	354	797	933	1273	1066	1179	858	377	234	206	162
11	308	801	1011	1317	1078	1166	862	366	237	201	165
12	273	803	1014	1264	1037	1140	853	370	239	210	158
13	183	603	809	1163	1003	1157	868	363	237	210	164
14	216	684	867	1200	942	1061	784	354	228	182	160
15	119	499	695	1005	904	1057	799	365	230	207	157
16	157	603	816	1207	974	1125	836	375	233	204	161
17	248	762	934	1238	1038	1165	861	374	238	212	166
18	118	480	754	1066	954	1064	805	374	236	207	158
19	239	788	894	1183	986	1037	802	360	232	202	158
20	159	615	900	1192	1008	1101	836	377	237	209	162
21	112	523	784	1115	950	1029	788	369	234	209	160
22	45	346	713	1102	961	1166	855	376	236	212	165
23	53	327	489	809	738	911	755	340	213	189	148
24	79	261	397	783	755	924	783	338	222	204	155
25	52	355	491	881	759	846	655	295	191	169	125
26	59	325	462	729	608	750	587	271	179	149	120
27	29	256	420	589	567	697	604	272	208	189	147
28	14	122	248	468	531	676	593	265	185	173	133
29	49	469	759	1191	1040	1160	867	378	238	211	166
30	8	134	240	517	482	674	598	283	183	172	145
31	16	194	437	563	623	664	569	321	210	198	151
32	2		11	20	76	161	187	167	127	126	102
33		14	43	143	201	404	392	176	142	121	106
34	5	53	137	297	414	564	551	236	192	173	144
35	6	73	149	304	344	554	508	239	177	162	126
36		6	20	56	149	270	329	*476	*422	*342	*377
37		3	88	223	324	523	445	*578	*425	*313	*321
38			25	81	184	373	341	*451	*370	*294	*308
39		1	13	64	152	343	375	*439	*351	*287	*300
40			15	61	150	293	345	*452	*361	*305	*345
41			28	77	120	269	302	*362	*350	*285	*312
42			5	25	117	273	256	*370	*311	*245	*287
43			5	41	120	280	351	*480	*431	*345	*355
44		1	20	53	88	178	260	*324	*310	*255	*273
45			4	43	99	154	232	*339	*307	*278	*307
46				10	39	127	180	*333	*331	*261	*302
47			4	19	39	140	193	*333	*352	*263	*286
48			2	8	19	95	180	*206	*234	*202	*243
49			1	4	19	103	158	*271	*272	*220	*297
50			3	20	43	127	191	*295	*294	*219	*242
51			2	7	15	72	92	*203	*209	*157	*208
52			2	11	17	49	99	*214	*284	*233	*269
53				3	7	41	82	*152	*188	*185	*222
54						6	24	*45	*75	*87	*97
55				2	4	22	64	*106	*131	*154	*203
56					1	3	21	*34	*49	*71	*87
Number tested...	770	770	695	758	579	615	444	192 *456	121 *310	106 *236	83 *229
Perfect Score...	1540	1540	1390	1516	1158	1230	888	384 *912	242 *620	212 *472	166 *458

TABLE XXXV

P.E. EQUIVALENTS OF DIFFERENCE BETWEEN 50 PER CENT AND PER CENT OF PERFECT SCORE MADE BY EACH GRADE FOR EACH SENTENCE OF THE GRADED SERIES

Sentence No.	Grade II	Grade III	Grade IV	Grade V	Grade VI	Grade VII	Grade VIII	Grade IX	Grade X	Grade XI	Grade XII
1	−.54	−1.96	−2.93	−2.75	−3.26	−3.08	−3.18		−3.94	−3.82	−3.11
2	−.49	−1.70	−2.19	−2.28	−2.38	−2.90	−2.81	−3.57	−2.90	−3.82	
3	.23	−.72	−1.02	−1.47	−1.64	−2.03	−2.27	−2.61	−2.81	−2.34	−2.56
4	−.48	−1.87	−2.27	−2.73	−3.01	−3.26	−3.18	−2.88	−3.57	−3.51	−3.11
5	.74	−.72	−1.43	−2.17	−2.96	−3.30	−3.64	−4.27		−3.51	−3.35
6	.18	−.95	−2.02	−2.86	−3.39	−4.08		−4.27			
7	1.27	−.10	−.90	−1.69	−2.19	−2.99	−3.11	−2.83	−3.57	−2.41	
8	.82	−.38	−1.03	−1.93	−2.18	−2.55	−2.88	−2.77	−3.57	−3.51	−3.35
9	1.31	.04	−.52	−1.31	−1.71	−1.95	−2.55	−3.01	−2.81	−2.93	−3.11
10	1.10	−.06	−.66	−1.47	−2.08	−2.58	−2.71	−3.11	−2.73	−2.83	−2.93
11	1.25	−.07	−.90	−1.66	−2.20	−2.41	−2.81	−2.48	−3.01	−2.41	−3.72
12	1.37	−.08	−.90	−1.44	−1.87	−2.15	−2.61	−2.67	−3.35	−3.51	−2.47
13	1.75	.41	−.31	−1.08	−1.64	−2.32	−2.99	−2.37	−3.01	−3.51	−3.35
14	1.60	.21	−.47	−1.20	−1.32	−1.62	−1.76	−2.10	−2.33	−1.59	−2.67
15	2.11	.68	0.00	−.62	−1.15	−1.59	−1.90	−2.45	−2.44	−2.93	−2.38
16	1.89	.41	−.33	−1.23	−1.48	−2.03	−2.32	−2.96	−2.65	−2.63	−2.79
17	1.47	.02	−.66	−1.34	−1.87	−2.40	−2.79	−2.88	−3.15		
18	2.11	.73	−.16	−.79	−1.38	−1.64	−1.96	−2.88	−2.93	−2.93	−2.47
19	1.51	−.04	−.54	−1.14	−1.54	−1.49	−1.93	−2.28	−2.58	−2.48	−2.47
20	1.87	.38	−.56	−1.18	−1.67	−1.86	−2.32	−3.11	−3.01	−3.26	−2.93
21	2.15	.61	−.24	−.93	−1.36	−1.46	−1.79	−2.61	−2.73	−3.26	−2.67
22	2.81	1.12	−.05	−.89	−1.41	−2.41	−2.65	−3.01	−2.90		−3.72
23	2.71	1.19	.56	−.13	−.52	−.96	−1.54	−1.78	−1.74	−1.83	−1.83
24	2.42	1.41	.84	−.06	−.58	−1.00	−1.76	−1.74	−2.05	−2.63	−2.23
25	2.71	1.09	.56	−.30	−.59	−.73	−.94	−1.09	−1.19	−1.23	−1.01
26	2.63	1.19	.64	.07	−.09	−.41	−.62	−.79	−.95	−.79	−.88
27	3.08	1.44	.77	.42	.04	−.25	−.69	−.81	−1.59	−1.83	−1.79
28	3.51	2.09	1.37	.74	.16	−.19	−.64	−.73	−1.07	−1.33	−1.25
29	2.75	.76	−.17	−1.18	−1.88	−2.34	−2.96	−3.18	−3.18	−3.82	
30	3.82	2.02	1.40	.61	.31	−.18	−.66	−.94	−1.03	−1.31	−1.69
31	3.45	1.71	.72	.49	−.14	−.15	−.53	−1.45	−1.66	−2.23	−1.99
32	4.60		3.57	3.30	2.23	1.66	1.19	.24	−.09	−.35	−.43
33		3.51	2.77	1.95	1.40	.66	.22	.16	−.33	−.26	−.53
34	4.08	2.71	1.92	1.27	.54	.16	−.46	−.43	−1.21	−1.33	−1.65
35	3.94	2.48	1.84	1.25	.79	.19	−.27	−.46	−.91	−1.07	−1.04
36		3.94	3.26	2.65	1.68	1.15	.49	−.08	−.70	−.88	−1.37
37		4.27	2.27	1.56	.87	.28	.00	−.51	−.71	−.62	−.78
38			3.11	2.40	1.48	.76	.44	.02	−.36	−.46	−.66
39		4.60	3.51	2.56	1.66	.87	.29	.07	−.25	−.41	−.59
40			3.39	2.60	1.68	1.06	.42	.01	−.30	−.55	−1.01
41			3.04	2.42	1.87	1.15	.61	.39	−.24	−.39	−.70
42			3.94	3.18	1.89	1.13	.83	.35	−.01	−.07	−.48
43			3.94	2.86	1.87	1.10	.39	−.10	−.76	−.91	−1.12
44		4.60	3.26	2.69	2.12	1.57	.81	.55		−.15	−.36
45			4.08	2.83	2.03	1.71	.95	.48	.02	−.33	−.65
46				3.64	2.71	1.87	1.23	.51	−.13	−.20	−.61
47			4.08	3.35	2.71	1.79	1.16	.51	−.25	−.21	−.47
48			4.60	3.82	3.18	2.11	1.23	1.11	.46	.27	−.11
49			4.60	4.27	3.18	2.04	1.37	.79	.23	.13	−.56
50			4.27	3.30	2.65	1.87	1.17	.68	.10	.13	−.10
51			4.60	3.94	3.22	2.33	1.87	1.13	.62	.64	.17
52			4.60	3.64	3.22	2.60	1.80	1.07	.16	.02	−.33
53				4.27	3.72	2.73	1.97	1.43	.76	.41	.06
54						3.82	2.86	2.45	1.73	1.33	1.19
55				4.60	3.94	3.11	2.17	1.77	1.19	.67	.21
56					4.60	4.27	2.93	2.65	2.09	1.54	1.30
Grade Position	1.69	3.29	4.52	5.45	6.29	7.11	7.76	8.33	9.05	9.45	9.76

TABLE XXXVI

LOCATION ABOVE ZERO SHOWN BY EACH GRADE FOR EACH SENTENCE OF THE GRADED SERIES 1=P.E.

Sentence No.	Grade II	Grade III	Grade IV	Grade V	Grade VI	Grade VII	Grade VIII	Grade IX	Grade X	Grade XI	Grade XII
1	1.15	1.33	1.59	2.70	3.03	4.03	4.58		5.11	5.63	6.65
2	1.20	1.59	2.33	3.17	3.91	4.21	4.95	4.76	6.15	5.63	
3	1.92	2.57	3.50	3.98	4.65	5.08	5.49	5.72	6.24	7.11	7.20
4	1.21	1.42	2.25	2.72	3.28	3.85	4.58	5.45	5.48	5.94	6.65
5	2.43	2.57	3.09	3.28	3.33	3.81	4.12	4.06		5.94	6.41
6	1.87	2.34	2.50	2.59	2.90	3.03		4.06			
7	2.96	3.19	3.62	3.76	4.10	4.12	4.65	5.50	5.48	7.04	
8	2.51	2.91	3.49	3.52	4.11	4.56	4.88	5.56	5.48	5.94	6.41
9	3.00	3.33	4.00	4.14	4.58	5.16	5.21	5.32	6.24	6.52	6.65
10	2.79	3.23	3.86	3.98	4.21	4.53	5.05	5.22	6.32	6.62	6.83
11	2.94	3.22	3.62	3.79	4.09	4.70	4.95	5.85	6.04	7.04	6.04
12	3.06	3.21	3.62	4.01	4.42	4.96	5.15	5.66	5.70	5.94	7.29
13	3.44	3.70	4.21	4.37	4.65	4.79	4.77	5.96	6.04	5.94	6.41
14	3.29	3.50	4.05	4.25	4.97	5.49	6.00	6.23	6.72	7.86	7.09
15	3.80	3.97	4.52	4.83	5.14	5.52	5.86	5.88	6.61	6.52	7.38
16	3.58	3.70	4.19	4.22	4.81	5.08	5.44	5.37	6.40	6.82	6.97
17	3.16	3.31	3.86	4.11	4.42	4.71	4.97	5.45	5.90		
18	3.80	4.02	4.36	4.66	4.91	5.47	5.80	5.45	6.12	6.52	7.29
19	3.20	3.25	3.98	4.31	4.75	5.62	5.83	6.05	6.47	6.97	7.29
20	3.56	3.67	3.96	4.27	4.62	5.25	5.44	5.22	6.04	6.19	6.83
21	3.84	3.90	4.28	4.52	4.93	5.65	5.97	5.72	6.32	6.19	7.09
22	4.50	4.41	4.47	4.56	4.88	4.70	5.11	5.32	6.15		6.04
23	4.40	4.48	5.08	5.32	5.77	6.15	6.22	6.55	7.31	7.62	7.93
24	4.11	4.70	5.36	5.39	5.71	6.11	6.00	6.59	7.00	6.82	7.53
25	4.40	4.38	5.08	5.15	5.70	6.38	6.82	7.24	7.86	8.22	8.75
26	4.32	4.48	5.16	5.52	6.20	6.70	7.14	7.54	8.10	8.66	8.88
27	4.77	4.73	5.29	5.87	6.33	6.86	7.07	7.52	7.46	7.62	7.97
28	5.20	5.38	5.89	6.19	6.45	6.92	7.12	7.60	7.98	8.12	8.51
29	4.44	4.05	4.35	4.27	4.41	4.77	4.80	5.15	5.87	5.63	
30	5.51	5.31	5.92	6.06	6.60	6.93	7.10	7.39	8.02	8.14	8.07
31	5.14	5.00	5.24	5.94	6.15	6.96	7.23	6.88	7.39	7.22	7.77
32	6.29		8.09	8.75	8.52	8.77	8.95	8.57	8.96	9.10	9.33
33		6.80	7.29	7.40	7.69	7.77	7.98	8.49	8.72	9.19	9.23
34	5.77	6.00	6.44	6.72	6.83	7.27	7.30	7.90	7.84	8.12	8.11
35	5.63	5.77	6.36	6.70	7.08	7.30	7.49	7.87	8.14	8.38	8.72
36		7.23	7.78	8.10	7.97	8.26	8.25	8.25	8.35	8.57	8.39
37		7.56	6.79	7.01	7.16	7.39	7.76	7.82	8.34	8.83	8.98
38			7.63	7.85	7.77	7.87	8.20	8.35	8.69	8.99	9.10
39		7.89	8.03	8.01	7.95	7.98	8.05	8.40	8.80	9.04	9.17
40			7.91	8.05	7.97	8.17	8.18	8.34	8.75	8.90	8.75
41			7.56	7.87	8.16	8.26	8.37	8.72	8.81	9.06	9.06
42			8.46	8.63	8.18	8.24	8.59	8.68	9.04	9.38	9.28
43			8.46	8.31	8.16	8.21	8.15	8.23	8.29	8.54	8.64
44		7.89	7.78	8.14	8.41	8.68	8.57	8.88	9.05	9.30	9.40
45			8.60	8.28	8.32	8.82	8.71	8.81	9.07	9.12	9.11
46				9.09	9.00	8.98	8.99	8.84	8.92	9.25	9.15
47			8.60	8.80	9.00	8.90	8.92	8.84	8.80	9.24	9.29
48			9.12	9.27	9.47	9.22	8.99	9.44	9.51	9.72	9.65
49			9.12	9.72	9.47	9.15	9.13	9.12	9.28	9.58	9.20
50			8.79	8.75	8.94	8.98	8.93	9.01	9.15	9.58	9.66
51			9.12	9.39	9.51	9.44	9.63	9.46	9.67	10.09	9.93
52			9.12	9.09	9.51	9.71	9.56	9.40	9.21	9.47	9.43
53				9.72	10.01	9.84	9.73	9.76	9.81	9.86	9.82
54						10.93	10.62	10.78	10.78	10.78	10.95
55				10.05	10.23	10.22	9.93	10.10	10.24	10.12	9.97
56					10.89	11.38	10.69	10.98	11.14	10.99	11.06
Grade Position.	1.69	3.29	4.52	5.45	6.29	7.11	7.76	8.33	9.05	9.45	9.76

The corrections for the results of the Graded Series, to compensate for the low ability shown by those who were tested with the entire Graded Series as compared with those tested by Scale

A only, are determined from Table XXXVII, which shows the differences, for each sentence of Language Scale A, between the results obtained in the Graded Series alone and the results obtained from all pupils who were tested with the sentences of Language Scale A. Table XXXVII is obtained by taking the difference on each sentence between the values shown in Table XXXVI and those shown in Tables XXIX and XXX.

TABLE XXXVII

Change of Location Above Zero Made in Each Sentence of the Graded Series by its Inclusion in Language Scale A

Sentence No.	Grade II	Grade III	Grade IV	Grade V	Grade VI	Grade VII	Grade VIII	Grade IX	Grade X	Grade XI	Grade XII
2	—.22	—.24	—.15	—.26	0	.11	.04	.16	.02	—.01	
4	—.28	—.27	—.35	—.38	—.21	—.23	—.14	—.02	—.09	.05	.05
7	—.12	—.11	—.18	—.09	—.19	—.06	.02	.07	—.09	—.02	
11	—.09	—.16	—.23	—.22	—.16	—.25	—.18	—.08	—.15	.09	—.11
22	—.55	—.12	—.19	—.31	—.35	—.19	—.24	—.14	.10		—.11
23	—.14	—.15	—.37	—.34	—.43	—.43	—.25	—.10	—.09	.17	—.05
24	.06	—.13	—.34	—.27	—.34	—.39	—.13	.06	.06	.20	.02
27	—.15	—.03	—.12	—.20	—.15	—.24	—.01	—.05	.12	.11	.10
28	—.26	—.10	—.26	—.22	—.19	—.24	—.03	—.02	—.04	.13	—.05
29	—.60	—.13	—.24	—.17	—.12	—.10	—.02	.03	.13	.58	
30	—.09	.04	—.31	—.10	—.31	—.23	—.11	.03	—.03	.11	.10
31	—.22	—.07	—.11	—.25	—.20	—.50	—.33	.23	.25	.23	—.16
34	.02	—.23	—.36	—.27	—.18	—.25	0	.01	.10	.19	—.01
36		.31	—.13	—.30	—.14	—.43	—.25	—.05	.03	.23	.32
37		—1.27	—.52	—.40	—.31	—.29	—.19	—.04	—.05	—.03	—.02
41			—.29	—.50	—.56	—.44	—.42	—.31	—.21	.10	—.40
43			—.59	—.50	—.37	—.38	—.19	—.14	.27	.11	.25
45			—.55	—.06	.03	—.16	—.01	—.01	.05	.25	.25
49			—.03	—.87	—.55	—.37	—.34	—.06	—.12	—.05	.11
52			—.45	.09	—.29	—.69	—.57	—.04	.07	—.11	.04
53				—.33	—.39	—.15	—.12	.08	0	.16	.22
54						—.62	—.42	0	—.03	.20	.04
55				—.62	—.40	—.46	—.14	.01	—.12	.06	.11
56					—.63	—.93	—.27	—.09	.02	.05	—.04
Below —1.		—.25	—.25	—.22	—.17	—.16	—.11	+.02	+.02	+.15	+.03
—1. to +1.	—.25	—.13	—.22	—.24	—.26	—.31	—.15	—.06	.00	+.08	+.04
Above +1.	—.20	—.17	—.35	—.38	—.41	—.46	—.31	—.01			

The changes indicated in Table XXXVII are not averaged as they were in the case of Table XXXI, but are grouped according to the nearness of the median of the distribution concerned to the sentence in question. All changes upon sentences more than 1 P.E. below the median are put into one group, all those upon sentences from 1 P.E. below to 1 P.E. above are put into another group, and those upon sentences more than 1 P.E. above are put into a third group, and each group is averaged. The averages of the groups are then used to correct the values of the sentences which were not given in Scale A, the corrections being applied within the same limits as were used in obtaining them. The result of employing these average changes as corrections is shown in Table XXXVIII.

TABLE XXXVIII

ESTIMATED LOCATION ABOVE ZERO OF EACH SENTENCE GIVEN IN THE GRADED SERIES ONLY

Sentence No.	Grade II	Grade III	Grade IV	Grade V	Grade VI	Grade VII	Grade VIII	Grade IX	Grade X	Grade XI	Grade XII
1	.90	1.08	1.34	2.48	2.86	3.87	4.47		5.13	5.78	6.68
3	1.67	2.44	3.25	3.76	4.48	4.92	5.38	5.74	6.26	7.26	7.23
5	2.18	2.44	2.84	3.06	3.16	3.65	4.01	4.08		6.09	6.44
6	1.62	2.21	2.25	2.37	2.73	2.87		4.08			
8	2.26	2.78	3.24	3.30	3.94	4.40	4.77	5.58	5.50	6.09	6.44
9	2.80	3.20	3.78	3.92	4.41	5.00	5.10	5.34	6.26	6.67	6.68
10	2.59	3.10	3.64	3.76	4.04	4.37	4.94	5.24	6.34	6.77	6.86
12	2.86	3.08	3.40	3.79	4.25	4.80	5.04	5.68	5.72	6.09	7.32
13	3.24	3.57	3.99	4.15	4.48	4.63	4.66	5.98	6.06	6.09	6.44
14	3.09	3.37	3.83	4.03	4.80	5.33	5.89	6.25	6.74	8.01	7.12
15	3.60	3.84	4.30	4.59	4.97	5.36	5.75	5.90	6.63	6.67	7.41
16	3.38	3.57	3.97	4.00	4.64	4.92	5.33	5.39	6.42	6.97	7.00
17	2.96	3.18	3.64	3.89	4.25	4.55	4.86	5.47	5.92		
18	3.60	3.89	4.14	4.42	4.74	5.31	5.69	5.47	6.14	6.67	7.32
19	3.00	3.12	3.76	4.09	4.58	5.46	5.72	6.07	6.49	7.12	7.32
20	3.36	3.54	3.74	4.05	4.45	5.09	5.33	5.24	6.06	6.34	6.86
21	3.64	3.77	4.06	4.28	4.76	5.49	5.86	5.74	6.34	6.34	7.12
25	4.20	4.21	4.86	4.91	5.44	6.07	6.67	7.26	7.88	8.37	8.78
26	4.12	4.31	4.94	5.28	5.94	6.39	6.99	7.48	8.12	8.81	8.92
32	6.09		7.74	8.37	8.11	8.31	8.64	8.51	8.96	9.18	9.37
33		6.63	6.94	7.02	7.28	7.46	7.83	8.43	8.72	9.27	9.27
35	5.43	5.60	6.01	6.32	6.82	6.99	7.34	7.81	8.14	8.53	8.75
38			7.28	7.47	7.36	7.56	8.05	8.29	8.69	9.07	9.14
39		7.72	7.68	7.63	7.54	7.67	7.90	8.34	8.80	9.12	9.21
40			7.56	7.67	7.56	7.71	8.03	8.28	8.75	8.98	8.78
42			8.11	8.25	7.77	7.78	8.44	8.62	9.04	9.46	9.32
44		7.72	7.43	7.76	8.00	8.22	8.42	8.82	9.05	9.38	9.44
46				8.71	8.59	8.52	8.68	8.78	8.92	9.33	9.19
47			8.25	8.42	8.59	8.44	8.61	8.78	8.80	9.32	9.33
48			8.77	8.89	9.06	8.76	8.68	9.43	9.51	9.80	9.69
50			8.44	8.37	8.53	8.52	8.62	8.95	9.15	9.66	9.70
51			8.77	9.01	9.10	8.98	9.32	9.45	9.67	10.17	9.97

The general difficulty of the Graded Series tests was calculated from Table XXXVIII in exactly the same way as the general values of the sentences in Scale A were calculated from Tables XXIX and XXX.

The amount of compensation for the lack of the College Graduate group was determined by finding what the value of the more difficult tests in Scale A would have been if the values from this superior group had not been used in calculating the general difficulty of the sentences. It was found that the College Graduate group had not influenced the general value of any Scale A sentence receiving a general value of less than 6.00 P.E. The sentences which without the C.G. group would have been located between 6.00 and 7.00 had been raised on the average .16 P.E. by the use of the C.G. group. Those sentences which had received between 7.00 and 8.00 had been raised .13; between 8.00 and 9.00, .08; between 9.00 and 10.00, .07; and above 10.00, .07. These averages were therefore applied as corrections to the general determinations for the Graded Series sentences, each average being applied to the range within which it had been found.

The final values obtained after all the corrections had been made are shown in Table XXXIX.

TABLE XXXIX

FINAL VALUES OF SENTENCES GIVEN IN THE GRADED SERIES ONLY

Sent. No.	Value
1	.96
3	3.33
5	2.52
6	1.98
8	2.94
9	3.76
10	3.41
12	3.58
13	4.03
14	4.88
15	4.81
16	4.15
17	3.66
18	4.42
19	4.47
20	4.09
21	4.40
25	6.32
26	7.00
32	8.91
33	8.38
35	7.42
38	8.42
39	8.58
40	8.46
42	8.86
44	8.95
46	9.04
47	9.03
48	9.50
50	9.28
51	9.78

TABLE XI

THE SCORE MADE ON EACH SENTENCE OF THE INTERMEDIATE SCHOOL SERIES

Sentence No.	Grade III	Grade IV	Grade V	Grade VI	Grade VII	Grade VIII
2	257	575	741	1046	1259	1736
4	302	774	790	1063	1336	1792
7	241	426	719	1044	1315	1742
11	224	424	714	1095	1358	1747
22	120	512	676	1015	1306	1745
29	146	519	646	966	1254	1744
23	115	424	553	595	1273	1604
24	97	309	522	543	1170	1613
27	97	272	365	605	912	1190
31	53	271	363	604	957	1317
35	54	196	346	519	950	1156
30	42	250	255	604	587	1266
32	25	136	217	373	723	1009
34	42	173	269	448	775	1066
36		25	73	163	525	615
43	2	26	86	174	506	512
41	2	46	130	227	514	874
45		15	34	81	219	460
49		2	21	52	216	476
52		6	5	30	165	427
53		1	7	16	69	201
55		2	7	7	71	154
54		3	5	7	33	115
56			2	6	24	72
No. tested.......	151	356	381	549	671	891
57	55	266	449	658	950	1317
58	86	295	479	742	1053	1475
59	8	98	228	423	782	1145
60	19	134	341	599	942	1363
61	45	239	447	729	1060	1556
62		21	54	73	253	478
63	78	266	483	786	1055	1556
64	13	132	314	496	882	1388
65		19	44	109	315	582
66	7	93	266	488	751	1115
67	22	109	319	576	891	1375
68	2	43	91	192	419	726
69	20	157	264	482	769	1173
70		20	72	130	385	674
71	5	74	195	391	683	1124
72	33	97	229	361	642	943
No. tested[1]......	100	268	357	517	643	865

---

[1] Some children did not have a chance to complete the sentences on the last page as their attention was not called to the fact that it contained sentences.

The remaining lists of tests were treated in the same manner as the Graded Series. The corrections to be made for differences of ability were derived by examining the behavior of the sentences of Language Scale A, which were always given with the new sentences in order to obtain just these comparisons. Corrections for the lack of grade groups were made by finding what would have happened if these grade groups had not been used in making up from Tables XXIX and XXX the final measure of the difficulty of the sentences of Scale A.

The following tables give merely the score made on each sentence, the number of pupils tested, and the final position assigned to the sentence.[1] In those cases where a sentence appeared in two different lists and therefore has two estimates of its final position recorded in the following tables, it will be well in practice to make use of the arithmetic average of the two determinations.

TABLE XLI

ESTIMATED FINAL VALUES OF SENTENCES IN INTERMEDIATE SCHOOL SERIES

Sent. No.	Value
57	5.98
58	5.55
59	7.46
60	6.83
61	5.85
62	8.92
63	5.54
64	7.02
65	8.74
66	7.40
67	6.93
68	8.28
69	7.16
70	8.50
71	7.64
72	7.55

---

[1] To show here the individual steps taken with each group of sentences would require the printing of an enormous quantity of statistical tables and would add nothing to the value of this study. The same methods and the same care were employed to secure accurate results as in the case of the sentences of the Graded Series. Publication of the scores made on these sentences will make it possible for other investigators to use my results in any way that may seem desirable.

TABLE XLII

SCORE MADE ON EACH SENTENCE OF HIGH SCHOOL SHORT TEST

Sentence No.	Grade IX	Grade X	Grade XI	Grade XII
2	160	98	60	40
4	160	100	60	39
7	158	100	60	40
11	160	100	58	40
22	162	97	60	40
29	160	98	58	40
23	156	95	53	40
24	145	92	57	37
27	132	83	55	33
31	122	78	54	40
28	125	84	50	34
30	126	83	51	32
37	114	80	41	29
34	110	77	47	35
36	99	70	40	23
43	111	65	46	30
41	92	65	39	33
45	64	51	34	21
49	64	67	31	25
52	48	50	37	31
53	24	33	18	18
55	18	44	25	17
54	8	16	4	9
56	16	14	10	10
78	29	35	20	22
79	73	63	36	23
80	69	64	36	27
81	75	65	35	25
82	37	29	26	19
83	25	27	15	18
84	12	19	13	13
85	8	8	4	2
86	0	4	0	0
87	15	12	12	7
88	15	17	5	7
89	1	1	1	0
No. tested.........	81	50	30	20

TABLE XLIII

ESTIMATED FINAL VALUES OF SENTENCES IN HIGH SCHOOL SHORT TEST

Sent. No.	Value
78	9.63
79	8.91
80	8.59
81	8.92
82	9.76
83	10.20
84	10.53
85	11.58
86	12.65
87	10.75
88	11.14
89	12.31

TABLE XLIV

SCORES MADE IN HIGH SCHOOL HALF TEST

Sentence No.	Grade X	Grade XI	Grade XII
4	84	400	264
7	82	401	268
22	82	397	264
24	76	372	241
27	75	333	237
30	73	340	230
37	55	276	194
36	50	248	187
45	30	179	140
49	39	238	155
55	15	114	100
54	10	51	51
70	68	323	223
65	49	252	187
79	44	263	190
90	7	73	48
91	28	118	89
92	26	158	104
93	27	179	125
94	51	210	182
95	46	264	211
78	12	68	77
82	37	165	136
83	12	37	45
84	7	52	36
96	16	70	66
97	10	42	38
No. tested...........	42	204	136

TABLE XLV

ESTIMATED FINAL VALUES OF SENTENCES IN HIGH SCHOOL HALF TEST

Sent. No.	Value
70	7.33
65	8.03
79	8.05
90	10.79
91	9.88
92	9.71
93	9.53
94	8.15
95	7.94
78	10.65
82	9.37
83	10.90
84	11.17
96	10.48
97	11.11

TABLE XLVI

SCORES AND ESTIMATES OF FINAL VALUES FOR SECOND GRADE EASY TEST

Sent. No.	Value	Score
73	1.18	475
74	1.28	436
75	1.63	353
1		468
2		427
4		469
76	1.97	302
77	1.09	429
3		308
5		276
6		324
8		138
10		172
7		115
11		75
29		54

TABLE XLVII

SCORES[1] MADE ON INTERMEDIATE GRADE HALF-TEST SENTENCES

Sent. No.	Grade VII	Grade VIII
98	333	388
99	208	296
100	103	171
101	287	315
102	344	380
103	82	126
104	68	133
105	274	357
106	270	351
107	251	321
108	59	72
4	400	459
7	402	453
22	400	446
24	361	413
27	231	301
30	278	318
37	207	249
36	88	121
45	54	80
49	40	78
55	14	25
54	6	16
No. tested	207	232

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[1] The final values of these sentences were not estimated, but the scores are given here in order that anyone who wishes to estimate their difficulty may have the necessary data.

APPENDIX

APPENDIX

1. CORRELATIONS

The writer of this monograph has not as yet undertaken a systematic study of the correlations shown by the language scales presented here. Such a study needs to be made, however, before it will be possible to say just how these tests are related to other tests of knowledge and ability. Such correlations as are reported here have been worked out incidentally, sometimes as a matter of curiosity and sometimes in connection with other studies. They are reported here merely to show the need that exists for further investigation.

Simpson,[1] who made a very thorough investigation of the correlations of intellectual tests, including the paragraph completion test, which he calls the Ebbinghaus test, has this to say with regard to the reliability of the completion test (p. 48): "Test XIV, Ebbinghaus mutilated test, was very high in reliability as used, easily the highest of all. The coefficients of correlation between the two halves of the test are: .96 for the Good, .93 for the Poor, and .92 for all together. It is beyond question a good test, and should be perfected and standardized, with a considerable number of specimens graded in difficulty."

Simpson estimates (p. 63) the true correlation between the Ebbinghaus test and the other tests used in his study as follows: Ebbinghaus test correlates with Hard Opposites .85, with Memory of Words .82, with Easy Opposites .72, with A Test .54, with Memory of Passages .71, with Adding .65, with Geometrical Forms .36, with Learning Pairs .60, with Completing Words .60, with Drawing Lengths .15, and with Estimating Lengths .33. His corrected coefficient for the correlation between the Ebbinghaus test and Estimated Intelligence is .89 (p. 75).

The Language Scales proposed in this report differ somewhat from the paragraphs used by Simpson in his study, and the correlations he has reported would probably not apply exactly to the tests used in this study. Although the writer is inclined to believe that the sentence tests are more accurate and that the correlations with them will be even higher than those shown with the paragraph tests, a thorough study of the correlations of the sentence tests is the only way in which this belief can be proved or disproved. Such a study will undoubtedly be made very soon. In the meantime the following results are suggestive of the sort of correlations we may expect.

In an unpublished study of the mental abilities of dependent children in certain institutions,[2] the "preliminary list" of completion-test sentences mentioned on page 4 was given, along with the Binet-Simon tests, the Stenquist tests of mechanical construction ability, and certain other tests. Before sending in the report of the results, the writer worked out a few coefficients of correlation[1] with two groups of children. In a group of 50 boys and girls, ages 10–16, the completion-test sentences gave a coefficient of .74 with the Binet tests, and .46 with the Stenquist test, which showed a coefficient of .62 with the Binet test. With a group of 39 boys, ages 10–16, the results were as follows:

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[1] B. R. Simpson: Correlations of Mental Abilities. Teachers College Contributions to Education, New York, 1912.

[2] Since the above section was written, this study has been published in the *Archives of Psychology*, No. 33, Sept., 1915. J. L. Stenquist, E. L. Thorndike, and M. R. Trabue: The Intellectual Status of Children who are Public Charges.

Completion tests with Binet tests, $r = .85$
Completion tests with Stenquist tests, $r = .59$
Stenquist tests with Binet tests, $r = .58$

In a certain seventh grade class of 30 children, in which some of the graduate students at Teachers College made a number of tests, Language Scale A made coefficients as follows:

with English Composition (Hillegas Scale), $r = .72$
with Courtis Problems in Division, $r = .04$
with Thorndike's Reading Scale Alpha, $r = .47$
with Thorndike's Reading Scale A, $r = .49$

In the sixth grade of 33 pupils, where the writer gave a number of tests, the results were as follows:

Language Scale A
with teacher's estimate of intelligence, $r = .74$
with Woody Multiplication Test, $r = .51$
with Courtis Multiplication Test, $r = -.12$
with Thorndike's Scale Alpha, $r = .47$

In a second sixth grade of 29 pupils, the results of certain tests were combined and the correlation worked out between the combined scores and the scores in Language Scale A. The results were as follows:

Language Scale A
with Combination of all marks made in one semester at school, $r = .49$
with Combination of Thorndike's Scale Alpha, Buckingham's Spelling Scale, and Hillegas's Composition Scale, $r = .58$
with Combination of Vocabulary Test, Opposites Test, Mixed Relations Test, and Proverbs Test, $r = .39$

As indicated above, these coefficients are not numerous enough or reliable enough to prove anything conclusively. They do suggest, however, that there is a positive and rather intimate relation between ability to complete sentences and ability in other tests of language and general intelligence.

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[1] Since there was good evidence that none of the tests used were evenly graded as to difficulty, it seemed best to use Spearman's formula, which takes into account only the relative positions of the individuals in the different tests. This formula, which is given on page 168 of Thorndike's Mental and Social Measurements, is as follows:

$\rho = 1 - \frac{6 \Sigma D^2}{n(n^2 - 1)}$. The ρ values are then converted into r values by means of the table given by Thorndike, which shows the r value for each possible ρ value as derived from the formula $r = 2 \sin\left(\frac{\pi}{6} \rho\right)$.

One rather surprising correlation has been reported to me by Professor W. D. Scott, of Northwestern University. Thirty efficiency experts employed by a large industrial concern in New England were tested by Dr. Scott, who used ten different tests, including a list of completion-test sentences prepared by the writer. Each member of the firm who knew the thirty experts made a list of them, arranging them in order according to his judgment of their efficiency as efficiency experts. Professor Scott mailed a list of the men, ranked according to the results of his ten tests, and on the same day the members of the firm mailed their lists to him. Professor Scott's combined results gave a coefficient of .87 with the combined judgment of the employers. The completion test, which was only one of the ten tests, had a coefficient of .64 with the employers' combined judgments, and with the combined result of all ten tests, $r = .69$.

2. SCHEME FOR SCORING SENTENCES

The question of what should be called correct and what should be called incorrect in scoring the sentences as completed is a question upon which a great deal of time and worry may be spent. The important thing about scoring the sentences, however, is not that the scheme used shall be absolutely perfect, but that the scheme used shall be used consistently.

These sentences might be used to measure a great variety of qualities in the individual completing them. For example, we might score altogether according to the correctness of the grammatical forms used. On the other hand, we might ignore grammar altogether and make these sentences test the child's understanding, scoring according to the child's grasp of the ideas suggested by the printed words. We might score according to the judgment shown or the truthfulness of the child's statements in the sentences as completed. Again, it might be possible to use these sentences as tests of memory for phrases, of richness of associations, of unity and clearness of expression, of aptness in the choice of words, of imagination, or of other characteristics.

The scheme that has actually been used has not been any particular one of the above possibilities, but simply a general combination of all of them. In some cases one element may have predominated in causing a decision, and in other cases another element. No one needs to follow the scheme shown below if he finds it wrong, for it is only given in order that it may be perfectly clear just which combinations were allowed and which were not allowed in this study. The important things for one to do are to be sure that he is making no great errors in judgment, to be consistent, and to report just how he did score each sentence. The writer suggests that the detailed scheme shown on the following pages be used as it stands in so far as possible, in order to secure uniformity and comparability.[1]

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[1] With the preliminary series, 5 points were given for perfect, 4 for slightly less than perfect, 3 for still less, etc. The present scheme (2–1–0) is practically the same as though the lower end of the older scheme (5–4–3–2–1–0) had been omitted, using 2 in place of 5, 1 in place of 4, and 0 in place of 3, 2, 1 and 0. With 40 pupils in each grade, the correlation between the relative difficulty of the preliminary-list sentences in the 6A grade and their relative difficulty in the 8B grade was .965 by the 5–0 method, .962 by the 2–0 method now used, and .958 if everything now scored 2 and 1 were called "right," and everything else "wrong."

The following general scheme has been the basis upon which the more detailed judgments have been based:

GENERAL SCHEME

Score 2

A score of 2 points is to be given each sentence completed perfectly. Errors in spelling, capitalization, and punctuation should not be allowed to affect the score.

Score 1

A score of 1 is to be given each sentence completed with only a slight imperfection. A poorly chosen word or a common grammatical error, which makes the sentence less than perfect and yet leaves it with reasonably good sense, should serve to reduce the score from 2 to 1.

Score 0

A score of 0 is to be given if the sentence as completed has its sense or construction badly distorted. A sentence must have reasonably good meaning and express a sentiment which might honestly be held by an intelligent person in order to receive a higher credit than zero.

DETAILED SCHEME

In those sentences having only one blank to be filled, any word appearing under the heading *Score 2* was considered entirely satisfactory as a completion of the sentence. Those words appearing under the heading *Score 1* were given half credit—a score of 1—while the words appearing under *Score 0* were given a score of 0. The score of each sentence should be written on the test paper just under or at the end of the sentence.

In those sentences where more than one blank appears, the different groups of words appearing below are arranged in their proper order and are connected by a dotted line to show the proper sequences: the first group on the left hand side of the page being words for the first blank in the sentence, and the dotted line showing what words are used in the next blanks to make up a combination of the value shown by the heading *Score 2*, *Score 1*, or *Score 0*, as the case may be. The commas are used merely to separate the fillers for the same blank and are not a part of the completion. An asterisk following a bracketed group of words indicates that this group of words will be indicated thereafter by an asterisk alone. Double asterisks, triple asterisks, etc., are also used to refer to and stand for entire groups of words. This device obviates the necessity of repeating an entire list of words for each combination in which the list may be used.

The lists given in the following pages are not exhaustive, but they are suggestive of the way the scoring has been done. In many cases a different tense of the same word has not been recorded. Anyone who uses this scheme will be called on constantly to make judgments upon new combinations.

LANGUAGE SCALE B

1. We like good boys .... girls.

Score 2
and, an, und,
Score 1
or, not, and good, also,
Score 0
for, with, said the, and the,

6. The .... is barking at the cat.

Score 2
dog, hound,
Score 1
dogs, boy, dog,
Score 0
man, cat, god,

8. The stars and the .... will shine tonight.

Score 2
moon,
Score 1
light, planets, lights,
Score 0
dipper, stripes, clouds, city, sky, sun,

22. Time .... often more valuable .... money.

Score 2
is, was, ... than,
Score 1
seems, becomes, ... than,
Score 0
are .... with, is .... with,

23. The poor baby .... as if it were .... sick.

Score 2

$$\left.\begin{array}{l}\text{cries, cried, acts, acted,}\\ \text{lies, lay, looks, looked,}\end{array}\right\}{*}\ldots\ldots\left\{\begin{array}{l}\text{very, getting,}\\ \text{quite, extremely,}\end{array}\right\}{**}$$

Score 1

$$\left.\begin{array}{l}\text{suffers, suffered, appears, moans, sighs,}\\ \text{lays, feels, behaves, was crying, groans,}\end{array}\right\}\ldots\ldots{**},$$

acts, looks, plays, ... never,

$${*}\ldots\ldots\left\{\begin{array}{l}\text{feeling, nearly, dangerously, rather, almost,}\\ \text{real, awfully, terribly, pretty, half, home,}\\ \text{sea, bad, about, often, so,}\end{array}\right.$$

Score 0
*.... not, was .... very,

31. She .... if she will.

Score 2

can, may,

Score 1

will, may go, can do well,

Score 0

does, works, goes, has, is, could, knows, might, plays, is good, can't,

35. Brothers and sisters .... always .... to help .... other and should .... quarrel.

Score 2

$\text{should....}\left\{\begin{array}{l}\text{try, strive, offer, seek,}\\ \text{agree, endeavor, learn, aim,}\\ \text{attempt, want,}\end{array}\right\}\text{*..each..}\left\{\begin{array}{l}\text{not}\\ \text{never,}\end{array}\right\}\text{**}$

Score 1

must ....* .... each .... **,

$\text{should ....}\left\{\begin{array}{l}\text{consent, like, go, work, love,}\\ \text{be ready, come, have, wish,}\end{array}\right\}\text{....each....**,}$

$\text{are....}\left\{\begin{array}{l}\text{expected, able, supposed, told,}\\ \text{glad, happy, willing, eager, ready,}\\ \text{bade, careful, good, apt, trying,}\\ \text{together, best, needed,}\end{array}\right\}\text{....each....**,}$

should .... * .... the, an, one, one an, ...**,

nearly .... have .... each ....**,

ought .... to try .... each ....**,

most .... * .... each ....**,

Score 0

should .... * .... out, along, some, ...**,

can .... go .... one ....**,

are .... ready .... one ....**,

have .... had .... each ....**,

are .... kind .... each ....**,

38. .... weather usually .... a good effect .... one's spirits.

Score 2

$\left.\begin{array}{l}\text{Cold, Pleasant, Balmy, Frosty,}\\ \text{Winter, Bright, Clear, Moderate,}\\ \text{Brisk, Spring, Fair, Cool, Mild,}\\ \text{Warm, Autumn, Beautiful,}\end{array}\right\}\text{*....has....}\left\{\begin{array}{l}\text{on,}\\ \text{upon,}\end{array}\right\}\text{**}$

Score 1

*.... had ....**,

$\left.\begin{array}{l}\text{Summer, Good, Fine, Nice, The, Hot, Sunny,}\\ \text{Calm, Rainy, Temperate, This, Such, Damp,}\\ \text{Windy,}\end{array}\right\}\text{.... has ....**,}$

* .... takes, produces, ...**,

Summer, Good, ... has ....**,

Score 0
*, Summer, Damp, Bad, ... has, is, ... to, in,
* . . . . makes, shows, ...**,
* . . . . gives . . . . to,
Bad . . . . has . . . .**,

48. It is very annoying to.................. ....toothache,..................
often comes at the most .... time imaginable.

Score 2
have. . .(a, the,)*. . .which. . { trying, unexpected, absurd, inconvenient, embarrassing, annoying, unwelcome, unusual, distressing, extraordinary, disagreeable, inopportune, undesirable, unfortunate, unsuitable, unreasonable, objectionable, } **
suffer . . . . from, with, ... which. . . .**,
Score 1
get, feel, suffer, bear, ...*. . . .which. . . .**,
{ have . . . .*, suffer. . . .from, } . . . .which. . . . { horrid, awkward, terrible, critical, unpleasant, busy, strange, important, unthinkable, peculiar, unlucky, harmful, valuable, strange, unlikely, unsatisfactory, unprepared, uncertain, awful, queer,
have. . . .*. . . .for it, as it, and it, that, it, ...**,
Score 0
have. . . .*. . . .and. . . .**,
have. . . .*. . . .which. . . . { unknown, pleasant, happy, joyful, worst, sudden,

54. To .... friends is always .... the .... it takes.

Score 2
{ have, make, win, gain, be, help, keep, } *. . . .worth. . . . { time, effort, trouble, } **
Score 1
{ see, satisfy, meet, greet, know, please, find, treat, visit, entertain, possess, obtain, } . . . .worth. . . .**,
*. . . .worth. . . .endeavor, energy, pains, patience, work,
Score 0
*. . . . for, worthy of, ...**,
win . . . . better . . . .longer,
our . . . . given . . . .best,

LANGUAGE SCALE C

2. The sky .... blue.

Score 2
is, was, became, turned, looks, appears, seems,
Score 1
got, is very, is not, is, as, has,
Score 0
are, light, very, dark,

5. Men .... older than boys.

Score 2
are, act, look, appear, seem,
Score 1
grow, were,
Score 0
be, see,

12. Good boys .... kind .... their sisters.

Score 2
are .... to,
Score 1
were, must be, should be, will be, act, is, ... to,
are .... with, toward, like, also, and,
and .... love, think .... of, do .... things for,
say .... words to,
Score 0
are .... for, as, by,

19. The girl fell and .... her head.

Score 2
hurt, injured, bruised, cut, hit, struck,
Score 1
bumped, knocked, came down on, crushed, fractured, broke,
Score 0
split, busted, on, bunked,

24. The .... rises .... the morning and .... at night.

Score 2
sun .... in, during, ... sets, sinks, disappears,
Score 1
temperature .... in .... falls,
boy, bird, ... in .... sleeps, rests,

tide .... in .... also, falls,
sun .... in .... { falls, goes, leaves, lowers, sits, moon, never, goes down, set, not, descends, drops, dies, the moon, fades, }

Score 0
sun .... in .... sometimes,
sun .... every .... sets,

30. The boy who .... hard .... do well.

Score 2
works, tries, studies, thinks, ... will,

Score 1
tries .... can, may, does, shall, should, could, must,
worked, tried, ... did, will, can,
plays, hits, work, ... will,

Score 0
tries .... sometimes, surely, often,
did .... work did, does .... work, work .... did,

37. Men .... more .... to do heavy work .... women.

Score 2
are .... { able, competent, willing, inclined, apt, ready, likely, } *.... than,
have .... ability, strength, inclination, power, ... than,

Score 1
are.... { prepared, anxious, eager, liable, fitted, equal, accustomed, suited, satisfied, fit, capable, used, adapted, wanted, required, taken, healthy, qualified, built, stronger, suitable, useful, } .... than,
have .... { ambition, energy, time, muscle, tools, right, business, } .... than .
try, like, ought, ... often .... than,
earn .... money .... than, has .... ability .... than,
know .... how .... than, eat .... food .... than,
need .... tools, money,.... than, appear ....*.... than,

Score 0
are .... made, asked, good, active, ... than,
are .... useful, able, ... for, work .... hard.. .. than,
do .... thinking .... than, have .... brains, work .... than,

44. The sun is so .... that one can not .... directly .... causing great discomfort to the eyes.

Score 2
{ brilliant, dazzling, radiant, bright, } *.... { look, gaze, stare, } **...at...it...without,

Score 1

{blinding, intense, strong, light, powerful, glary, hot, red, fiery, high,} . . . ** . . . at . . . it . . . without,
* . . . . endure, bear, stand, ... its . . . . rays . . . . without,
* . . . . ** . . . . into, toward, towards, ... it . . . . without,
*, blinding, intense, ... ** . . . . at . . . . it . . . . unless, for, if,
low . . . . read . . . . a . . . . book . . . . without,
* . . . . even . . . . look . . . . up . . . . without,

Score 0

warm, far, low, ... ** . . . . at . . . . it . . . . without,
* . . . . ** . . . . at . . . . it . . . . because, thus,
* . . . . see . . . . it . . . . so . . . without,

53. The knowledge of .... use fire is .... of .... important things known by .... but unknown ... . animals.

Score 2

how . . . . to . . . one . . . {the, many, several,} * . . . {man, men, us, mankind, people,} ** . . . . {to, by, among,} ***,

Score 1

how . . . . to . . . . one . . . . * . . . . persons, scouts, humans, ... ***,
why . . . . we . . . . one . . . . * . . . . ** . . . . ***,
when, having, the way, ... to . . . . one . . . . * . . . . ** . . . . ***,
how . . . . to . . . . considered, rated, thought, ... * . . . . ** . . . . ***,
how . . . . to . . . . one . . . . most . . . . ** . . . . ***,

Score 0

how . . . . to . . . . often . . . . * . . . . ** . . . . ***,
the . . . . {proper, correct, careful, important, skillful, great,} . . . . one . . . * . . . ** . . . ***,
knowing . . . . how to . . . . one . . . . * . . . . ** . . . . ***,

56. One ought to .... great care to .... the right .... of ...., for one who .... bad habits .... it .... to get away from them.

Score 2

{use, take, exercise,} * . . . . {form, choose, acquire, gain, cultivate, develop, adopt, establish, learn, teach, begin,} ** . . {sort, kind,} *** . . . habits
. . . . {has, gains, contracts, forms, acquires, contracts,} *** * . . . . finds . . . . {hard, difficult,} *** **

$$*..**..\text{ habits }..\left\{\begin{array}{l}\text{living, life,}\\ \text{working, work,}\\ \text{studying, study,}\\ \text{speaking, speech,}\\ \text{thinking, thought,}\\ \text{learning, mind,}\\ \text{procedure, action,}\\ \text{attention, acting,}\end{array}\right\}\begin{array}{c}***\\ ***\end{array}...\substack{***\\ *}...\text{ finds }...\substack{***\\ **}$$

Score 1

$$*....\left\{\begin{array}{l}\text{obtain, get,}\\ \text{possess, use,}\\ \text{have, pursue,}\\ \text{make, lead,}\end{array}\right\}...\left\{\begin{array}{r}***....\text{habits}\\ \\ \text{habits}....\substack{***\\ ***}\end{array}\right\}..\substack{***\\ *}..\text{finds}..\substack{***\\ **},$$

$$*....**....***....\text{habits}....\left\{\begin{array}{l}\substack{***\\ *}\text{, gets,}\\ \\ \text{makes,}\end{array}\right\}.\text{finds}.\left\{\begin{array}{l}\text{impossible,}\\ \text{pays,}\end{array}\right.$$

$$*....**....\left\{\begin{array}{r}***....\text{habits}\\ \\ \text{habits}....\substack{***\\ ***}\end{array}\right\}....\substack{***\\ *}....\left\{\begin{array}{l}\text{has,}\\ \text{makes,}\end{array}\right\}....\substack{***\\ **}$$

$$\left.\begin{array}{l}\text{have,}\\ \text{give,}\end{array}\right\}...**...\left\{\begin{array}{r}\text{habits}....\substack{***\\ ***}\\ \\ ***....\text{habits}\end{array}\right\}....\substack{***\\ *}....\text{finds}....\substack{***\\ **},$$

$$\text{take}....\text{use }....***....\text{ speech }....\substack{***\\ *}....\text{ finds }....\substack{***\\ **},$$

$$*....\text{ be }....***....\text{ person }....\substack{***\\ *}....\text{ finds }....\substack{***\\ **},$$

$$*....**....\text{ habits }....\left\{\begin{array}{l}\text{morality,}\\ \text{manhood,}\end{array}\right\}....\substack{***\\ *}....\text{finds}....\substack{***\\ **},$$

$$*....\text{ begin }....\text{ way }....\text{ living}....\substack{***\\ *}....\text{ finds }....\substack{***\\ **},$$

$$*....\text{ do }....\text{ thing }....\text{ course }....\substack{***\\ *}....\text{ finds }....\substack{***\\ **},$$

$$*....\text{ do }....\ ***....\text{ things }....\substack{***\\ *}....\text{ finds }....\substack{***\\ **},$$

Score 0

$$*....\left\{\begin{array}{l}\text{get }....\text{ start }....\text{ life}\\ \text{do }....\text{ thing }....\text{ life}\end{array}\right\}....\substack{***\\ *}....\text{ finds }....\substack{***\\ **},$$

LANGUAGE SCALE D

4. We are going .... school.

Score 2
to, through, toward, before, after,
Score 1
into, from, to the, as a,
Score 0
at, in,

76. I .... to school each day.

Score 2
go, come,
Score 1
am, am going, like to go,
Score 0
like, to, going,

11. The .... plays .... her dolls all day.

Score 2
girl, child, baby, ... with,
Score 1
boy, girls, cat, dog, children, little girl, ... with,
Score 0
girl .... to, for,

21. The rude child does not .... many friends.

Score 2
have, make, gain, win,
Score 1
deserve, find, know, acquire, possess, keep, greet, appreciate, accumulate, help, please, obey, meet, get, see,
Score 0
want, like, care for, need, has,

63. Hard .... makes .... tired.

Score 2
work .... $\left\{\begin{array}{l}\text{one, people, you, him, her,}\\ \text{me, men, women, them, us,}\end{array}\right\}$ *
Score 1
work .... a man, minds, bodies,
traveling, tasks, luck, things, ...*,
Score 0
thing, bread, times, ...*,

27. It is good to hear .... voice .... friend.

Score 2

the .... of .... { a, one's, our, your, my, another,
some, his, her, any, their, } *

Score 1

the .... of .... one, an old, a true, the, an intimate,
your .... my .... dear, good, her .... to .... her,
a .... from, of, ... a, your, her, ... calling .... your, her,
your .... again, tonight, ... my, that .... of .... my,
Caruso's .... with .... his, her .... said .... Mary's,

Score 0

the .... from ....*, your .... with, than, ... your,
one's .... said .... his, a .... of, from, ... your,
his .... and .... his,

71. The happiest and .... contented man is the one .... lives a busy and useful ....

Score 2

(most, best,)* .... (who, that,)** .... life.

Score 1

*.... which .... life,
well, brightest, richest, the, nice,
loveliest, strongest, healthiest, more, } .... ** .... life,

Score 0

good, poor, ... ** .... life,

42. The best advice .... usually .... obtained .... one's parents.

Score 2

(may, can, will,)*.... be .... from,
is .... { directly, that, correctly, freely,
easily, readily, promptly, first,
fully, soon, accurately, properly, } ** .... from,
has, ... been .... from,

Score 1

might, could, would, should, ... be .... from,
*.... be .... of, by, through,
is .... { rightly, well, best, only,
to be, better, willingly,
fairly, cheerfully, } .... from,
is ....**.... of, by, through, most, received, ... is .... from,
one .... has .... from, comes .... when .... from,

Score 0

is .... always, often, not, also, being, ... from,
children .... have .... from, is .... best, to be, ... by,

51. .... things are .... satisfying to an ordinary .... than congenial friends.

Score 2

Few .... more .... { man, person, child, mortal, individual, boy, girl, woman, } *

Most .... less ....*,

Score 1

Few .... more .... { friend, companion, stranger, people, acquaintance,

Play .... more .... child, boy, girl,

Many, Some, No, Good, Sometimes, These, More, Those, New, One's Queer, Such, Many, Ordinary, What, } .... more, less, ...*.

Score 0

Kind, All, The, Small, Often, Flattering, ... more ....*,

Few .... more .... one, condition,

Few .... not .... man, Many.... more ....friend,

Many .... quite ....*,

84. .... a rule one .... association .... friends.

Score 2

As ....(enjoys, prefers, likes, desires, welcomes, seeks,)*....with,

Score 1

As ....*.... of, As .... makes .... with,

As .... { holds, keeps, cultivates, finds, chooses, wishes, loves, gains, } .... with, of,

Score 0

As .... chooses .... and,

As .... keeps .... his,

Although .... like .... of,

LANGUAGE SCALE E

73. I see you. Can you see ....?

Score 2

me,

Score 1

the cat, men, us, it,

Score 0

I can, yes,

75. Ice is cold, but fire is ....

Score 2

hot, warm,

Score 1

good, not, red, burning,

Score 0

how, burned, cold,

7. The kind lady .... the poor man a dollar.

Score 2

gave, gives, offers, offered, paid, pays, took, sent, loaned, lent, handed, tendered,

Score 1

found, lends, loans, hands, sends, takes, give, is giving,

Score 0

finds, helps, owes, owed,

18. The best .... to sleep is at night.

Score 2

time,

Score 1

hour, way,

Score 0

place, bed, air, girl, boy, of all, go, thing, when, thing is,

58. Children should .... many lessons from .... parents.

Score 2

(learn, take, receive, obtain, get,)*.... their,

Score 1

study, have, observe, know, ... their,
obey .... from,
*.... the,

Score 0

show, do, recite, ... from, have .... your,

25. The child .... the river .... was drowned.

Score 2

fell....in, into, ... and,
went, sprang,
jumped, waded, } **.... into .... and,**

Score 1

swam, bathed, played, was, ... in ....and,
went.... { **to, down, on,** / **near, in,** } **.... and,**
ran .... to, into, ... and,   **played, sat, ... near .... and,**
who .... crossed .... yesterday,   **who fell .... into .... soon,**
was ....at, on, ...and,
playing .... { **by .... side,** / **on .... bank,**   **playing .... near .... accidentally,**

Score 0

went .... by .... and,   **was .... to, by, ... and,**
played .... at .... and,   **goes .... to .... and,**
swam .... through .... and,   **playing .... by .... today, nearly,**

34. It is a .... task to be kind to every beggar .... for money.

Score 2

hard, burdensome,
difficult, great, big, } ***...(who, that,)**...(asks, begs, pleads,)*****
real, trying,

Score 1

philanthropic, charitable, heavy,
bitter, noble, small, foolish, pleasant, } **....**....***,**
good, little, bad, kind, worthy, mean,
***....**....calls, cries, comes, seeks, wants, looks, wishes, works,**
***.... when .... asked, he asks,**   ***.... asking .... one,**
.... which ....,**

Score 0

daily, poor, fine, nice, friendly, easy, ...***,**
***.... which ....calls, cries, comes, etc.**   ***....**.... needs,**
polite .... here .... asking,   **good .... that .... comes,**

36. Worry .... never improved a situation but has .... made conditions ....

Score 2

has .... { **often, usually, always, generally, merely,** / **undoubtedly, sometimes, only, certainly,** / **slowly, probably, simply, repeatedly surely,** } ***..worse,**
certainly, surely, ...*.... worse,

Score 1

$$\text{has ....}\left\{\begin{array}{l}\text{rather, really, ever, mostly, even,}\\ \text{instead, just, indeed, helped,}\end{array}\right\}\text{....worse,}$$

has ....*.... serious, poor, change, poorer, bad, harder, miserable,
has .... always, gradually, ... serious, poor, etc.

Score 0

has .... never .... worse,   will .... often .... worse,
has .... never, often, ... better,   should .... often ....worse,
never .... often .... worse,   can .... sometimes .... worse,

52. When one feels drowsy and ...., it .... happens that he is .... to fix his attention very successfully .... anything.

Score 2

$$\left.\begin{array}{l}\text{dull, tired, stupid, weary,}\\ \text{fatigued, lazy, indolent,}\\ \text{sleepy, inattentive, ill,}\\ \text{inert, indisposed, sick,}\end{array}\right\}\begin{array}{c}*\\ \text{....}\end{array}\left\{\begin{array}{l}\text{usually, always,}\\ \text{generally,}\\ \text{frequently,}\\ \text{sometimes, often,}\end{array}\right\}**$$

$$\text{.... unable ....}\left\{\begin{array}{l}\text{on,}\\ \text{upon,}\end{array}\right\}***$$

*....(seldom, rarely, never,)$\underset{*}{***}$.... able ....***,

Score 1

$$\text{weak, sad, bored, cross, is, tired,....}\left\{\begin{array}{l}\text{**.... unable}\\ \underset{*}{***}\text{....able}\end{array}\right\}\text{....***,}$$

*....$\underset{*}{***}$....able....to, at,

*.... invariably, soon, just, then, so, ... unable....***,
*....**....failing, able, slow, unfit, not able, too tired, unfit,..***
*....$\underset{*}{***}$....trying, going, ready, liable, apt, ...***,

lazy .... never .... apt .... on,

Score 0

*....**....never....***,   sick....generally....made....***,
sleepy .... often .... not ....***,
tired .... sometimes .... lazy .... on,

83. In order .... clearly at .... it is .... to .... artificial ....

Score 2

$$\text{to...see..night...necessary...}\left\{\begin{array}{l}\text{use....(light, means, devices,)*}\\ \text{have....light,}\end{array}\right.$$

Score 1

$$\text{to....see....}\left\{\begin{array}{l}\text{times,}\\ \text{all, sea,}\end{array}\right\}\text{....}\left\{\begin{array}{l}\text{necessary,}\\ \text{essential,}\end{array}\right\}\text{,....have, use....*}$$

$$\text{to...think...}\left\{\begin{array}{l}\text{times,}\\ \text{all,}\end{array}\right\}\text{...necessary...}\left\{\begin{array}{l}\text{use,}\\ \text{avoid,}\end{array}\right\}\text{..stimulants,}$$

to . . . look . . . light .... necessary .... have .... protection,
to ... see .... night .... better, best, ... use....*,
to .... hear, speak, ... times, first, ... necessary .... use,
adopt, ... means,
to .... understand, explain, ... times, ... necessary .... use
.... examples,
to .... see .... night .... necessary .... use .... glasses,

Score 0

to .... see.... distance .... better .... have .... light,
to .... see .... once .... best .... try .... means,
to .... look .... something .... advisable .... remove .... aids,
to .... think ... times .... necessary .... use .... means,

LANGUAGE SCALE J

29. Boys and .... soon become .... and women.

Score 2

girls .... men,

Score 1

girls, girl .... man, girls .... gentlemen,

Score 0

girl .... mans, men .... poor,

61. The .... are often more contented .... the rich.

Score 2

poor .... than,

Score 1

poor, people, ... with, by, children, people, ... than, girls .... with,

Score 0

girls, men, parents, ... than,

64. The rose is a favorite .... because of .... fragrance and ....

Score 2

flower .... its .... beauty, color,

Score 1

flower .... the .... beauty, color, smell, blossoms, sweetness,
flower .... its .... scent, smell, appearance, sweetness, blossoms,

Score 0

flower .... sweet, nice, ... looks, pretty,

41. It is very .... to become .... acquainted .... persons who .... timid.

Score 2

$$\text{(hard, difficult,)*....}\left\{\begin{array}{l}\text{well, thoroughly, fully,}\\ \text{intimately, personally,}\end{array}\right\}\text{**..with..are,}$$

Score 1

$$\left.\begin{array}{l}\text{trying, tiresome, pleasant, possible, nice,}\\ \text{unusual, awkward, unpleasant, annoying,}\\ \text{fine, strange, uncommon, inconvenient,}\\ \text{kind, easy, grand, good, sensible,}\\ \text{troublesome, necessary, commendable,}\end{array}\right\}\text{**...with...are,}$$

$$\text{*....}\left\{\begin{array}{l}\text{really, slightly, merely, closely, properly,}\\ \text{rapidly, fairly, nicely, quite, familiarly,}\\ \text{readily, quickly, better, much, more, so,}\end{array}\right\}\text{..with..are,}$$

*....**.... with .... seem, act, appear, look,

Score 0

nice .... much .... with .... are,
well, unwise, customary, wrong, bad, ...**....with .... are,

$$\text{*....}\left\{\begin{matrix}\text{good, goodly, kindly, easily,}\\ \text{strongly, real, immediately,}\end{matrix}\right\}\text{.... with .... are,}$$

93. Extremely old .... sometimes .... almost as .... care as ....

Score 2

$$\left.\begin{matrix}\text{people}\\ \text{persons}\end{matrix}\right\}\text{*....}\left\{\begin{matrix}\text{need,}\\ \text{take,}\\ \text{require,}\end{matrix}\right\}\text{**...much...}\left\{\begin{matrix}\text{babies,}\\ \text{infants, young,}\\ \text{children, invalids,}\end{matrix}\right\}\text{***}$$

Score 1

*.... are .... much, great, ...***,
age .... brings .... much .... youth,
age .... seems .... much ..... sickness,
men .... take .... much .... women,
books .... need .... much .... new,
people .... have, show .... little .... young,

Score 0

things ....**.... much .... trouble,

87. One's .... in life .... upon so .... factors .... it is not .... to state any single .... for .... failure.

Score 2

$$\text{success....}\left\{\begin{matrix}\text{depends,}\\ \text{rests,}\end{matrix}\right\}\text{*....many....that....}\left\{\begin{matrix}\text{easy,}\\ \text{safe,}\\ \text{wise,}\end{matrix}\right\}\text{**}$$

$$\text{....}\left\{\begin{matrix}\text{rule....avoiding,}\\ \text{cause....}\left\{\begin{matrix}\text{his, her, one's,}\\ \text{every, any, a,}\end{matrix}\right.\end{matrix}\right.$$

Score 1

$$\left.\begin{matrix}\text{position, conduct,}\\ \text{course, status,}\\ \text{purpose, aim,}\end{matrix}\right\}\text{....*....many....that}$$

....**....rule....avoiding,

$$\text{success....*....many....that....**....}\left\{\begin{matrix}\text{reason,}\\ \text{conditon,}\\ \text{factor,}\end{matrix}\right\}$$

$$\text{....}\left\{\begin{matrix}\text{one's}\\ \text{our, complete,}\end{matrix}\right.$$

Score 0

success....*....many....that....true....reason...our,

89. The future .... of the stars and the facts of .... history are .... now once for all, ... I like them .... not.

Score 2

$\left.\begin{matrix}\text{course, destiny,}\\ \text{circuits, paths,}\end{matrix}\right\}$ *.... $\left\{\begin{matrix}\text{ancient,}\\ \text{past, their,}\end{matrix}\right\}$ **..fixed..whether...or,

Score 1

*....**....known, learned, settled, ... whether .... or,
*.... future .... fixed .... whether .... or,

Score 0

*....**.... fixed, known, ... and, although, ... them,

LANGUAGE SCALE K

16. The boy will .... his hand if .... plays with fire.

Score 2
burn .... he,
Score 1
injure, hurt, heat, warm, ruin, dirty, ... he,
Score 0
use, shake, hold, lose, suck, wash, ... he,

57. Hot weather comes in the .... and .... weather .... the winter.

Score 2
summer .... (cold, snowy, icy,)*.... in,
summer .... cool .... precedes,
Score 1
summer, spring, ... the, bad, rainy, ... in,
spring....*... in, brings,
Score 0
summer....*.... comes,

28. The poor little .... has .... nothing to ....; he is hungry.

Score 2
boy, lad, chap, fellow, child, *...(had, found, absolutely,)**....eat,
Score 1
*.... got, received, almost, really, simply, even, probably....eat,
baby, creature, man, beggar, thing, pig, dog, bird,....**....eat,
*....eaten....day, *,baby, creature, etc..... ....eat,
Score 0
*....**....do, wear, *.... no, not, hardly, never, entirely, ...eat,

33. Very few people .... how to spend time and .... to the best advantage.

Score 2
(know, learn,)*....(money, energy, effort,)**
Score 1
*.... thought, study, work, think, put it, knows....**,
find, show, ...**,
Score 0
find .... work, think, *.... go, send, try, do,

82. One .... not, as a ...., ... attention .... uninteresting things.

Score 2

(can, does, will,)*....rule, fact, ... (give, pay,)**....to,
*,should,.... rule....**....to, *....child....**....to,
*....rule....attract, call, direct, ...to,

Score 1

*....rule,....**, fix, put, hold,....on,

$$*\ldots\left\{\begin{array}{l}\text{student, teacher,}\\ \text{necessity,}\\ \text{reader, practice,}\end{array}\right\}\ldots\left\{\begin{array}{l}\text{place} \ldots \text{ in,}\\ **\ldots \text{ to,}\\ \text{maintain}\ldots\text{with,}\\ \text{hold} \ldots \text{ by,}\end{array}\right.$$

has .... rule .... much .... for,
should .... idiot, practice, ...**.... to,

Score 0

*.... spectator .... keep .... to,
looks .... tarter .... giving .... to,

90. To eat .... one is .... is a .... pleasure.

Score 2

(when, whenever,)*.... hungry .... (great, real,)**
(till, until,)***.... satisfied....**,

Score 1

*.... well, happy, ...**, food, what, ... fond of....**,
***....full, stuffed,....**, heartily....told, convinced,....**,
what, whatever,.... forbidden, given,.... doubtful, **,

Score 0

delicious .... sure....**, when .... enjoying .... marked,

86. .... they .... us .... not, nature's .... are .... and unchangeable.

Score 2

$$\text{Whether}\ldots\left\{\begin{array}{l}\text{suit, affect,}\\ \text{impress, concern,}\\ \text{favor, disturb,}\end{array}\right\}*\ldots\text{or}\ldots\left\{\begin{array}{l}\text{laws,}\\ \text{ways,}\end{array}\right\}**\ldots\text{fixed,}$$

Score 1

Whether .... convince, effect,.... or ....**....fixed,
If ....*.... or....**....fixed,
Whether .... influence .... or ....**....true, inflexible,

Score 0

Even .... suit .... or ....roads .... sure,

LANGUAGE SCALE L

60. Children .... are rude .... not easily win friends.

Score 2
(who, that,)*....(do, can, will,)**
Score 1
*.... may, should, must,   which ....**,
Score 0
may be .... but,

66. Plenty .... exercise and .... air .... healthy .... and girls.

Score 2
of .... (fresh, pure, good,)*.... makes ....boys,
Score 1
of ....*.... make .... boys,
of .... clear, plenty of, ... makes .... boys,
outdoor, work, study, ...*.... makes .... boys,
of ....*.... is .... to boys, for boys,
Score 0
of .... healthy .... give .... boys,

70. In .... to maintain .... health, one should have nourishing ....

Score 2
order .... (one's, his, good,)*....(food, foods,)**
Score 1
seeking, trying, helping, traveling, }
summer, winter, spring, truth, illness, } ....*....**,
order .... our, your, ...**
Score 0
life ....*....**,   time ....*....**,

65. .... happiness can not be .... with money.

Score 2
True, Real, Great, Your, Our, }
His, Her, One's, Children's, } *....(bought, compared,)**
Score 1
Some, Plenty, No, People's, } .... { **, gotten, secured,
Often, All, Much, } .... { obtained,
*, Much, Always, Sometimes, ... { gotten, secured, had,
{ won, insured, made,
Score 0
Good .... made,   Your .... counted,   Their .... repaid,

32. One's .... do .... always express his thoughts.

Score 2

(words, statements,)*.... not,

Score 1

expressions, looks, actions, sayings, features, word, lips, ... not,
words .... almost, actions .... nearly, most,

Score 0

ways, eyes, opinions, ... not, expressions .... nearly,

92. To .... to wait, after having .... to go ...., ... very annoying.

Score 2

have.... $\left\{\begin{matrix}\text{prepared, planned,}\\ \text{decided, promised,}\\ \text{arranged, hurried,}\end{matrix}\right\}$ *.... $\left\{\begin{matrix}\text{somewhere, out,}\\ \text{away, home,}\end{matrix}\right\}$ **..is,

have ....*.... promptly .... is, have .... asked ...**...is,

Score 1

have .... waited ....**.... is,
stop .... attempted....** .... is,
have....*, wanted, wished, had,....is....sometimes, often,
have....lunch....swimming....is,
have....had....quickly, far,....is,
have....somewhere, far,....often, have....had...away...is,

Score 0

have .... preparing .... there .... is,
have ....had ....work .... is,

78. It is sometimes .... to .... between two .... of action.

Score 2

(difficult, hard,)*....choose....(lines, modes, courses,)**
necessary .... hesitate ....**,

Score 1

*, necessary, ... choose, distinguish,....kinds, types,
dangerous .... go .... men,

Score 0

safe .... go .... guns,

97. One can .... do his .... at one .... while .... of another.

Score 2

$\left.\begin{matrix}\text{not,}\\ \text{never,}\end{matrix}\right\}$ *.. $\left\{\begin{matrix}\text{best,}\\ \text{duty,}\end{matrix}\right\}$ **... $\left\{\begin{matrix}\text{thing, task, job,}\\ \text{occupation, study,}\end{matrix}\right\}$ ***..thinking,

Score 1

*....**.... time, place, ... thinking, dreaming,
often....**....***, time, place, ... thinking,

Score 0

also ....**.... time .... not, *....**.... time .... seeing,
easily .... work .... time .... talking,

79. Nothing can .... one's happiness .... effectively than a guilty ....

Score 2

destroy, injure, mar, lessen,
decrease, ruin, spoil, } ....more....conscience,

Score 1

harm, hurt, hinder, dampen, effect, darken,...more...conscience,

Score 0

stunt, hinder, ... more .... man, person,

45. To .... many things .... ever finishing any of them .... a .... habit.

Score 2

begin, undertake,
attempt, leave,
commence, start,
try, plan, } *......without...... { is, becomes, } **..bad,

Score 1

take, have, do, make, say,
stop, think, get, avoid, } ....without....**....bad,
*....hardly, before, not, n, never, ...**....bad,
*....without....**.... deplorable, pernicious, tenacious, strange,
*....without....forms, seems, starts,....bad,

Score 0

take, have, do, make,....before, not,....**....bad,
take, have, etc.....without....seems, starts, forms,....bad,
do....when....**....bad, *....and....**....bad,

91. The .... seems .... and dreary .... a discouraged ....

Score 2

(world, day,)*...(dull, dark, sad,)**...to... { man, woman, person, child, boy, girl, } ***
road....long....to....traveler,

Score 1

way, time, road,....long....to....***, voyager,
teacher, man, boy,....sad....and, over,....***, mortal,
man....tired....after....attempt, *....**....when....***,
*....**....for....***, *....**....giving....feeling,

Score 0

*....long....although....***,

LANGUAGE SCALE M

67. One can not foretell .... will happen in the ....

Score 2

what.... { future, morning, autumn, winter, night, end, spring, summer, } *

Score 1

what.... { city, crowd, present, family, house, month, year, morrow, day, world,

things that ....*,

Score 0

what .... time, past, today,   that ....*,

59. The dog .... a useful .... because .... his intelligence and faithfulness.

Score 2

is....(animal, creature, friend, pet, beast, companion,)*....of,

Score 1

is .... fellow, thing, being, dog, ... of,
becomes....*....of,   is ....*.... he has,

Score 0

is ....*.... by,   has .... manner .... of,

95. Many people .... their health because .... do not .... the .... of hygiene.

Score 2

lose, injure, ruin, undermine, destroy, } *.they. { observe, heed, understand, know,practice, follow, keep, } ***
...... { principles, laws, rules, } *** *

keep .... they .... neglect ....*** *

*.... they .... know .... need, good, value, meaning,

Score 1

wreck, mar, haven't, spoil, waste,....they....***....*** *

*....they....study.... { science, subjects, books, lessons, study, rules,

have....they....disregard....study, subject, science,

Score 0

protect .... they .... want .... disease,
lose .... they .... acquire .... value,
have .... they .... follow .... *** *, ethics,

79. Nothing can .... one's happiness .... effectively than a guilty ....

Score 2

destroy, injure, mar, lessen,
decrease, ruin, spoil, } ....more....conscience,

Score 1

harm, hurt, hinder, dampen, effect, darken,...more...conscience,

Score 0

stunt, hinder, ... more .... man, person,

45. To .... many things .... ever finishing any of them .... a .... habit.

Score 2

begin, undertake,
attempt, leave,
commence, start,
try, plan, } *......without...... { is, becomes, } **..bad,

Score 1

take, have, do, make, say,
stop, think, get, avoid, } ....without....**....bad,

*....hardly, before, not, n, never, ...**....bad,

*....without....**.... deplorable, pernicious, tenacious, strange,

*....without....forms, seems, starts,....bad,

Score 0

take, have, do, make,....before, not,....**....bad,

take, have, etc.....without....seems, starts, forms,....bad,

do....when....**....bad,   *....and....**....bad,

91. The .... seems .... and dreary .... a discouraged ....

Score 2

(world, day,)*...(dull, dark, sad,)**...to... { man, woman, person, child, boy, girl, } ***

road....long....to....traveler,

Score 1

way, time, road,....long....to....***, voyager,

teacher, man, boy,....sad....and, over,....***, mortal,

man....tired....after....attempt,   *....**....when....***,

*....**....for....***,   *....**....giving....feeling,

Score 0

*....long....although....***,

55. .... that are .... to one by an .... friend should be pardoned .... readily than injuries done by one .... is not angry.

Score 2

Injuries ....done..... { angry, angered, irate, enraged, } * ...more.... { who, that, } **

Score 1

Injuries .... done ....*.... more .... which,
Injuries .... given, rendered,....*....more....**,
Injuries .... done ....*.... less ....**,
Injuries...done... { irritated, incensed, old, another, injured, intimate, other, honest, innocent, ordinary, unkind, } ...more...**,
{ Insults, Harms, Wrongs, Slights, Offences, Things, } ....done....*....more....**,
Words....spoken....irritated....more....**,

Score 0

Things....done....unknown....more....**,
Injuries....done....*....very....**,

88. It is .... that a full-grown man should .... a ghost .... he is ....

Score 2

{ inconceivable, improbable, impossible, unbelievable, } *....see.... { while, when, if, } **
.... { sane, sober, awake, } ***
*........see........unless, except, ... insane, drunk, absurd, strange,....fear........**....***,

Score 1

best....show....that....unafraid, said....fear....if..wise,
foolish....fear....since....grown, strange....see..**..***,
unwise....become....before, until,....dead,
*....believe....story....reading, *....be....**....dead,

Score 0

strange....know....when....alone,

OTHER SENTENCES USED IN THIS STUDY

3. I see .... man and the boy.

Score 2
the,
Score 1
a, some, that, one, our, your, my, both the, the big,
Score 0
big, this,

9. Here is a man who .... do it.

Score 2
can, could, couldn't, can't, will, would, wouldn't, won't, may, cannot, might, should, shouldn't, does, must, doesn't,
Score 1
did, shall, does not, likes to, ought to, saw him, dared to,
Score 0
dared, never, always, will try to,

10. The bird .... a song every morning.

Score 2
sings, sang, sung,
Score 1
will sing, sing, has, warbles, chirps, pipes, sings us, gives, gives us,
Score 0
likes, did, songs, song,

13. Boys must .... be rude to .... mothers.

Score 2
(not, never,)* .... their,
Score 1
***.... good, dear, any, our, your, the,**
Score 0
***.... his, her, seldom, always, ... their,**

14. When the .... grows older he .... be a man.

Score 2
(boy, youth, lad,)* .... will,
Score 1
***.... { may, must, can, shall, should, could, would,**
might, has to, is to, begins to, comes to,
child, son, baby, brother, man, boys, ... will,
Score 0
***.... says, ... will,**

15. The stars .... brightly at ....

Score 2

(shine, shone, gleam, twinkle,)* .... night,

Score 1

* .... { midnight, evening, seven, last, us, me,
you, him, home, 7:30, 8 o'clock, }

shines, appear, look, show, sparkle,
come out, were shining, } .... night,

Score 0

shining, are, ... night, *.... the sky, the town, city,

17. The wind .... the dust into our eyes.

Score 2

blows, blew, blowed, sweeps, swept,

Score 1

throws, carried, gets, sends, chases, carries, raises, brings, puts,
threw, got, brought, sent, chased, raised, will blow, put, is blowing,

Score 0

draws, makes, has, flew,

20. The little .... and his dog .... running a race.

Score 2

(boy, fellow, lad,)* .... (are, were, began,)**

Score 1

*....came, went, kept, try, play, like, won, was, is,
child, master, man, ...**, came, went, etc.

Score 0

girl ....**, cat ....**, *.... had,

26. Boys who play .... mud get their hands ....

Score 2

in .... the .... (dirty, soiled, muddy,)**

Score 1

in .... the .... black, wet, sticky, filthy, nasty,
in, around, ... wet, dirty, soft, black, any, with, near, ...**,
marbles, games, ball, ... in, with, ...**,
with dirt, in dirt, ... and ....**, at .... moulding ....**

Score 0

in, with, ..:. dirty, soft, ... dusty, ..., much, ... in ....**,

39. If a person injures one by ...., without having intended any ...., one should .... insulted.

Score 2

accident, chance,
carelessness, } *.... { injury, offence, harm, disrespect, insult, affront, } **....
thoughtlessness,

{ not, never, } ***.... { be, feel, become, } ***
*

Score 1

mistake, words, remarks, talking, gossip,
fooling, unthoughtfulness, mishap, talk,
speaking, fun, ignorance, anything, word,
speech, something, haughtiness, shoving,
pushing, hitting, joking, jokes, } ....**....***....****,

*....**....***....get, act,
accident....accident....***....****,

*.... { wrong, thing, unkindness, hurt,
mischief, malice, mishap, trouble, } ....***....****,

Score 0

slander, insulting, snubbing, shooting, slapping, ...**...***...****,

40. A shelter .... the weather is .... appreciated on a .... day.

Score 2

from.... { greatly, thoroughly,
fully, heartily, duly,
certainly, usually,
highly, always,
generally, truly,
indeed, much, keenly, } *.... { stormy, rainy,
snowy, wintry,
cold, bad, hot, } **

from .... rarely, not, seldom, ... pleasant, beautiful, bright,

Score 1

from.... { only, surely, best, well, sincerely,
most, fairly, quite, kindly, more,
better, often, to be, deeply, } ....**
from ....*.... damp, summer, wet, warm, against ....*....**,
from .... not .... { pretty, summer, sunny, warm,
good, clear, nice, fine,

Score 0

from .... very, good, glad, not, ...**, to, in, for, of,....*....**,

43. A home is .... merely a place .... one .... live comfortably.

Score 2

(not, often, sometimes,)*.... where .... (may, can,)**

Score 1

*.... in which, that, ...**, will, would, should,
generally, usually, just,
now, really, now never, } .... where ....**,
*, generally, usually, etc. .... for .... to, *.... so ....**,

Score 0

*.... where .... does, *.... for ....who,
but, only, always, ... where ....**,

LANGUAGE SCALE K

16. The boy will .... his hand if .... plays with fire.

Score 2
burn .... he,
Score 1
injure, hurt, heat, warm, ruin, dirty, ... he,
Score 0
use, shake, hold, lose, suck, wash, ... he,

57. Hot weather comes in the .... and .... weather .... the winter.

Score 2
summer .... (cold, snowy, icy,)*.... in,
summer .... cool .... precedes,
Score 1
summer, spring, ... the, bad, rainy, ... in,
spring....*... in, brings,
Score 0
summer....*.... comes,

28. The poor little .... has .... nothing to ....; he is hungry.

Score 2
boy, lad, chap, fellow, child, } *...(had, found, absolutely,)**....eat,
Score 1
*.... got, received, almost, really, simply, even, probably....eat,
baby, creature, man, beggar, thing, pig, dog, bird,....**....eat,
*....eaten....day, *,baby, creature, etc..... ....eat,
Score 0
*....**....do, wear, *.... { no, not, hardly, never, entirely, } ....eat,

33. Very few people .... how to spend time and .... to the best advantage.

Score 2
(know, learn,)*....(money, energy, effort,)**
Score 1
*.... thought, study, work, think, put it, knows....**,
find, show, ...**,
Score 0
find .... work, think, *.... go, send, try, do,

82. One .... not, as a ...., ... attention .... uninteresting things.

Score 2

(can, does, will,)*....rule, fact, ... (give, pay,)**....to,
*,should,.... rule....**....to, *....child....**....to,
*....rule....attract, call, direct, ...to,

Score 1

*....rule,....**, fix, put, hold,....on,

$*\ldots\left\{\begin{array}{l}\text{student, teacher,}\\ \text{necessity,}\\ \text{reader, practice,}\end{array}\right\}\ldots\left\{\begin{array}{l}\text{place .... in,}\\ **\text{.... to,}\\ \text{maintain....with,}\\ \text{hold .... by,}\end{array}\right.$

has .... rule .... much .... for,
should .... idiot, practice, ...**.... to,

Score 0

*.... spectator .... keep .... to,
looks .... tarter .... giving .... to,

90. To eat .... one is .... is a .... pleasure.

Score 2

(when, whenever,)*.... hungry .... (great, real,)**
(till, until,)***.... satisfied....**,

Score 1

*.... well, happy, ...**, food, what, ... fond of....**,
***....full, stuffed,....**, heartily....told, convinced,....**,
what, whatever,.... forbidden, given,.... doubtful, **,

Score 0

delicious .... sure....**, when .... enjoying .... marked,

86. .... they .... us .... not, nature's .... are .... and unchangeable.

Score 2

$\text{Whether}\ldots\left\{\begin{array}{l}\text{suit, affect,}\\ \text{impress, concern,}\\ \text{favor, disturb,}\end{array}\right\}*\ldots\text{or}\ldots\left\{\begin{array}{l}\text{laws,}\\ \text{ways,}\end{array}\right\}**\ldots\text{fixed,}$

Score 1

Whether .... convince, effect,.... or ....**....fixed,
If ....*.... or....**....fixed,
Whether .... influence .... or ....**....true, inflexible,

Score 0

Even .... suit .... or ....roads .... sure,

LANGUAGE SCALE L

60. Children .... are rude .... not easily win friends.

Score 2

(who, that,)*....(do, can, will,)**

Score 1

*.... may, should, must,   which ....**,

Score 0

may be .... but,

66. Plenty .... exercise and .... air .... healthy .... and girls.

Score 2

of .... (fresh, pure, good,)*.... makes ....boys,

Score 1

of ....*.... make .... boys,
of .... clear, plenty of, ... makes .... boys,
outdoor, work, study, ...*.... makes .... boys,
of ....*.... is .... to boys, for boys,

Score 0

of .... healthy .... give .... boys,

70. In .... to maintain .... health, one should have nourishing ....

Score 2

order .... (one's, his, good,)*....(food, foods,)**

Score 1

seeking, trying, helping, traveling, }
summer, winter, spring, truth, illness, } ....*....**,
order .... our, your, ...**

Score 0

life ....*....**,   time ....*....**,

65. .... happiness can not be .... with money.

Score 2

True, Real, Great, Your, Our, }
His, Her, One's, Children's, } *....(bought, compared,)**

Score 1

Some, Plenty, No, People's, } .... { **, gotten, secured,
Often, All, Much, } .... { obtained,
*, Much, Always, Sometimes, ... { gotten, secured, had,
{ won, insured, made,

Score 0

Good .... made,   Your .... counted,   Their .... repaid,

32. One's .... do .... always express his thoughts.

Score 2
(words, statements,)*.... not,
Score 1
expressions, looks, actions, sayings, features, word, lips, ... not,
words .... almost, actions .... nearly, most,
Score 0
ways, eyes, opinions, ... not, expressions .... nearly,

92. To .... to wait, after having .... to go ...., ... very annoying.

Score 2
have.... { prepared, planned, decided, promised, arranged, hurried, } *.... { somewhere, out, away, home, } **..is,
have ....*.... promptly .... is, have .... asked ...**...is,
Score 1
have .... waited ....**.... is,
stop .... attempted....** .... is,
have....*, wanted, wished, had,....is....sometimes, often,
have....lunch....swimming....is,
have....had....quickly, far,....is,
have....somewhere, far,....often, have....had...away...is,
Score 0
have .... preparing .... there .... is,
have ....had ....work .... is,

78. It is sometimes .... to .... between two .... of action.

Score 2
(difficult, hard,)*....choose....(lines, modes, courses,)**
necessary .... hesitate ....**,
Score 1
*, necessary, ... choose, distinguish,....kinds, types,
dangerous .... go .... men,
Score 0
safe .... go .... guns,

97. One can .... do his .... at one .... while .... of another.

Score 2
{ not, never, } *.. { best, duty, } **... { thing, task, job, occupation, study, } ***..thinking,
Score 1
*....**.... time, place, ... thinking, dreaming,
often....**....***, time, place, ... thinking,
Score 0
also ....**.... time .... not, *....**.... time .... seeing,
easily .... work .... time .... talking,

Score 1

is....put....to.... { subdue, overcome, crush, calm, change, cure, conquer, push, prevent, guard, hide, stop, consider, conceal,
is .... bring, take, set .... to ....*,
is .... bring .... to .... overcome, subdue,

Score 0

is .... set .... to .... maintain,
is .... bring .... to .... conceal,
is .... try .... and .... stop,

96. .... want are often caused by ....

Score 2

Poverty .... and .... { drink, ignorance, laziness, sickness, disease, neglect } *

Score 1

Times .... of .... famine,
Cases .... of ....*,
Things...people...selfishness, jealousy, indulgence, imagination,
Need .... and .... pleasure,
People .... in ....*,
What .... girls .... variety,

Score 0

Health .... and .... laziness,   Horrors .... of .... obstinacy.
Hunger .... and .... cries,   Conditions .... in .... neglect,

98. Children .... to pick ....

Score 2

like .... (flowers, berries, apples, fruit, daisies)*

Score 1

come, are, came, are not, go, likes, went, try, were, wish, have, ought } ....*,
climb, jump, ... apples,   like .... flower, nuts,
try .... quarrels, playmates,

Score 0

go .... stick,

99. All animals .... shelter during a ....

Score 2

(seek, hunt, like, want, need, require,)* .... storm,
* .... shower, rain,

Score 1

find, have, take, get, love, look for .... night, shower, rain,
* .... winter,   need .... day,

Score 0

are, will, do .... storm,   have, shall .... year, day, summer,

100. Sympathetic .... are .... to dumb ....

Score 2

people, boys, men, girls, women, persons, children, *... (kind, good)** ... (animals, persons)***

Score 1

*....**.... ones, friends, pats .... pleasant .... animals,
characters, friends, ...**....***, signs .... best .... persons,
persons .... sympathetic ....***,
words .... kind, nothing,....animals,
feelings, hearts, ... shown ....***,

Score 0

things, actions ....**....***, people .... often .... animals,
children .... not .... to learn, forms .... used .... people,
always .... good .... people,

101. A boy .... run .... than a ....

Score 2

can, will, may)*....(further, better, faster)**....(baby, girl)***
can .... more .... mile,

Score 1

cannot .... faster .... horse,
likes to .... better, more, ... girl, man,
could, should,....**....***, should, has, can't,...more...mile,
*, could, should, ... quicker, sooner, more, swifter, ...***,
can .... faster .... snail, cat, rat, dog, always...faster...girl,
can, would, ... rather, sooner, oftener, ... girl,
will, can, should ....**.... man,

Score 0

can .... fast .... man, took .... and ... jump,
who ... more .... mile,

102. A .... drink is very refreshing to a .... who is ....

Score 2

cold, cool, good, fresh ... person, laborer, men, runner, woman, girl, child, tramp, boy, workmen, **.... thirsty, hot, ill, tired, working, sick, traveling, exhausted, warm, ***

Score 1

healthy, soft, common, little, fine, water, beer, whiskey, soda, 5 cent, clean, ...**....***,
*.... man, girl, boy .... healthy, well, here, running,
*.... dog ....***,
little, small .... boy ....***, *....**.... dry,

Score 0

fine .... man .... good,

103. A joke .... one's self is seldom thoroughly ....

Score 2

(on, upon, about)* .... appreciated, enjoyed,

Score 1

*.... { pleasant, told, seen, played, known, reasonable, good,
funny, explained, expressed, kept, likes,

to, with .... funny, by .... amusing,

Score 0

about .... queer, in, of .... finished, with, in .... true, good,

104. One feels .... inclined to work .... it is ....

Score 2

(little, less)* .... (when, if,)** .... (hot, warm)***
much, more, ...**.... cold, cool,

Score 1

*.... after .... dark, * ....**.... winter, nice,
very ....**.... interesting,
dis, not, }
seldom, } .... while, **, ... hot,
himself, }
seldom, really, rather, ...**.... necessary,
himself, }
much, } ...**... time, important,
well....**....easy,
often .... ** .... raining,
not ....for .... hard,
much ... though ...hard,

Score 0

so, too, very, almost, it, ... when .... hot, day,

105. Brothers .... sisters should always .... to help .... other.

Score 2

and... { try, offer, strive, aim, endeavor, learn, seek,
consent, want, attempt, wish, like, agree, } *...each,

Score 1

and .... have, go, hurry, stay, love, work, be ready, come,...each,
and ....*.... one, an, the, one, some, one an,
and .... ask .... each,

Score 0

and ....*.... out, along, and .... agree .... an,
and .... go .... the, and .... glad .... each,

106. Birds have .... which enable them to .... through the ....

Score 2

wings .... fly .... { air, woods, streets, sky,
clouds, country, meadows, } *

Score 1

wings .... go ....*, wind, world, food .... eat .... winter,
wing, foods, ... fly ....*, nests .... sleep, rest, ... night,
beaks .... pick .... summer, feathers .... fly ....*,
power .... fly ....*, feathers .... live .... winter, cold,
wings, ... fly .... place,

Score 0

instincts, trees .... live .... year, that .... go .... air,
incense .... wander .... world, homes .... fly .... winter,

107. .... the weather is .... one should wear heavier .... than when it is ....

Score 2

$$\text{(When, If)}^{*}..\text{(cold, cool)}^{**}..\left\{\begin{array}{l}\text{clothing, clothes,}\\ \text{garments, cloaks,}\\ \text{coats, wraps,}\\ \text{underwear,}\end{array}\right\}^{***}..\left\{\begin{array}{l}\text{hot,}\\ \text{warm,}\end{array}\right\}^{***}_{*}$$

Score 1

*....**....***.... warmer, good, nice,
*.... stormy ....***.... nice, hot,
cold .... when ....***....$^{***}_{*}$,

*.... winter .... ***.... summer, *.... bad....***....$^{***}_{*}$,

Although....**....***....$^{***}_{*}$, As, Now,...**...clothes...$^{***}_{*}$,

Score 0

How .... no ....***.... cold,
Like .... today ....***....$^{***}_{*}$, Tho....warm....***....$^{***}_{*}$,

Here, Sometimes....**....***....$^{***}_{*}$,

108. One cannot .... his .... thoroughly .... he has good teeth.

Score 2

(chew, masticate, grind, bite)* .... food .... (unless, until)**,

Score 1

eat .... food, meals, supper ....**, do .... work ....**,
have .... health .... unless, spoil .... looks .... when, if,
*.... food .... without, maintain .... health .... unless,

Score 0

eat, chew, ... food .... when, if, because, though,
clean .... teeth .... when, keep .... teeth .... clean, unless,
have .... way .... till,

3. CALCULATION OF MEDIAN SCORE IN LANGUAGE SCALES

Each child who spends the allotted amount of time in an attempt to complete the sentences of any of the language scales described in this study should be given as a total score the sum of the number of points made upon the individual sentences contained in the scale. For example, the child who completes perfectly the first three sentences of Scale B, and almost perfectly the fourth sentence in this scale, should be given a total score of seven points on Scale B. (2+2+2+1=7.)

To find the ability of the class, it will be necessary to take into consideration the total score made by each child in the class. A distribution should therefore be prepared showing the scores made by the individual members of the class. This distribution should indicate the number of pupils in the class who make a score of zero, the number making a score of one, the number making a score of two, the number making a score of three, and so on for each step up to twenty, the highest possible score in Scales B to E. As examples of this sort of distribution, we may take the following:

Number of Times Each Score Was Made in Language Scale C

Score	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Group X	.	3	5	8	4	3	2	2	.	1	.		.	.	.	.	.	.	.	.
Group Y	.	.	.	1	.	2	3	5	6	4	3	2	1	2	.	.	.	.	.	.
Group Z	.	.	.	.	.	.	.	.	2	2	3	5	4	.	6	3	4	2	1	.

There are 28 individuals in Group X, 29 individuals in Group Y, and 32 individuals in Group Z. The only adequate comparison of these three groups is such a table as that shown above, or a surface of distribution representing the same facts. The average score, or even the median score, is in itself inadequate as a measure of the group, although it is usually desirable to calculate the median as an indication of the central tendency of the group's ability.

The median of any distribution is that point on the scale which divides the distribution into two exactly equal parts. When the scales are very crude, and measurements of small numbers of individuals are being considered, it is not worth while to locate the median point any more accurately than by indicating upon what step of the scale it falls. In the case of carefully derived scales, however, it is often desirable, especially where the group to be measured is reasonably large, to locate the exact point within the step where the median falls. This median point in the case of the scales here presented may well be calculated to the tenth, or even to the hundredth of a unit, if 200 or more individuals are in the group being measured.

Since there are 28 individuals in Group X of the distributions shown above, the median point will evidently fall between the fourteenth and the fifteenth individuals. If we begin with the three individuals making a score of 2, and count up through the five individuals making a score of 3, we should have to count out six of the eight individuals making a score of 4 in order to arrive at the point upon each side of which an equal number (14) of papers were scored.

It now becomes necessary to define the fourth step. Some of those scored four may have been worth just barely 4 points, while others of this group may have been worth almost 5 points. It is impossible, of course, to know at just what points between these two extremes each of the eight individuals was located. The best single assumption to make, and the one which should always be made, is that those individuals scoring upon any single step of a scale are distributed along the step at equal distances from each other. We may therefore assume that the eight individuals scored upon step 4 range from 4.0 to 4.999 and lie at equal distances from each other along this range.

If we count out six, therefore, of the eight individuals who scored on step 4, we shall arrive at a point which is approximately 4.7. 4.7 is therefore the median point of Group X.

Similarly there are 29 individuals in Group Y. The middle case is the fifteenth individual, who is the fourth of the six scored on step 9. This individual has fourteen persons scored above him in ability and fourteen persons scored below him in ability. The median point, therefore, will lie at the middle of that fraction of the step assigned to him. In order to reach this point it will be necessary to count out three and a half of the six individuals scored on step 9, which brings us to 9.6, the median of Group Y.

Group Z presents a peculiar problem in the calculation of its median. There are 16 individuals above score 14, and 16 individuals below score 14. Probably the wisest assumption to make is that the four individuals scored on 13 take up all of the thirteenth step and that the six individuals scored upon 15 take up all of that step. If this is assumed, the median falls upon step 14, probably at 14.5, since any given distance on a scale is best represented by its middle point.

The 25 percentile and the 75 percentile are to be found in a manner similar to that for finding the median, counting into the distribution one-fourth of the total number of cases for the first, and three-fourths of the total number of cases for the second.

4. TENTATIVE STANDARD SCORES IN LANGUAGE SCALES B, C, D, AND E

The new scales proposed in this monograph have not as yet been employed upon a sufficiently large number of children in each grade to establish any definite standards of attainment. Although each sentence has been well tested in other combinations, the scores that will be obtained with the new scales can only be estimated. It seems worth while, however, especially for Scales B, C, D, and E, which will probably be employed somewhat more generally than the four special-type scales, to indicate in a general way what results may be expected in each school grade. The writer therefore gives below the best estimate[1] he is able to make of the median score that any given school grade should make on one of these four scales.

Grade	Median
II	3.0
III	6.0
IV	8.0
V	9.6
VI	11.0
VII	12.3
VIII	13.3
IX	14.2
X	15.3
XI	15.8
XII	16.2

The above tentative standards will not be found to be exact for any given scale, but until we have accurate results from a large number of applications of each scale in each grade, the above figures may be used as the best estimate available for any one of the four scales. On the whole it may be said that the above estimates are more likely to be too low than to be too high. One may also expect the same class or classes of equal ability to make a median score from .4 to .8 of a point lower in Scale C than in Scale B, while the median on either Scale D or Scale E will probably fall between that obtained on Scale B and that obtained on Scale C.

With a view to establishing more accurate standards of attainment, the writer will be pleased to receive copies of the results obtained by any investigator employing any of the scales proposed in this monograph. If anyone, having five hundred or more public school pupils to measure, is willing to coöperate to the extent of reporting to the writer the score of each child on each sentence of the scale used, the writer will be glad to send him blanks for making such records and to refund 10 per cent of the purchase price of the scales (as purchased from the Teachers College Bureau of Publications) immediately upon receipt of such reports.

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[1] In making this estimate it is of course assumed that anyone who wishes to compare their results with these figures will make the tests carefully as directed on pages 20 to 22 of this monograph, employing the blanks furnished by the Teachers College Bureau of Publications, and scoring each sentence according to the scheme given in Section 2 of this Appendix. Any deviations from this procedure should not be made without making allowances for differences in the results.

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